An easy way to optimize your cutting plans

AutoNEST User Guide

CONTENTS

1. Introduction…… **1-1**

2. Operating System Requirements……. **2-1**

3. Program Installation……. **3-1**

3.1 Hardware Lock……. **3-2**

3.2 Hardware Lock Replacement Policy…… **3-3**

3.3 Network Installation…… **3-4**

3.4 Standalone Installation……..…… **3-10**

4. *Auto*NEST Under AutoCAD Environment

4.1 Getting Started…….. **4-1**

4.1.1 *Auto*NEST Process……. **4-1**

4.1.2 *Auto*NEST Features…… **4-4**

4.2 Sysdata…… **4-7**

4.3 Parts……. **4-11**

4.3.1 SavePart……... **4-12**

4.3.2 ConvertPart……. **4-14**

4.3.3 ViewPart……. **4-16**

4.3.4 MirrorPart…….. **4-18**

4.3.5 ExpandPart…….. **4-20**

4.4 Irregular Stock……... **4-22**

4.4.1 SaveIrStock…….. **4.23**

4.4.2 ConvertIrStock……. **4-25**

4.4.3 ViewIrStock……. **4-27**

4.5 TaskEdit……..… **4-28**

4.6 Nesting……. **4-42**

4.6.1 Nesting…….. **4-43**

4.6.2 *Batch*Nesting…… **4-46**

4.7 ViewNEST…… **4-48**

4.8 UpdateNEST……... **4-51**

4.9 About AutoNEST …… **4-52**

5. *Auto*NEST Under Nest Manager Environment

5.1 Getting Started…….. 5-1

5.1.1 AutoNEST Process……. 5-2

5.1.2 AutoNESTFeatures…… 5-4

5.2 Sysdata…… **5-5**

5.3 DXF2PRT……. **5-9**

5.3.1 DXF2PRT……. **5-9**

5.4 DXF2STK…… **5-12**

5.4.1 DXF2STK…… **5-12**

5.5 TaskEdit……... **5-15**

5.6 Nesting……. **5-29**

6. File Format…….. **6-1**

6.1 .VEC Format……...……. **6-2**

6.2 STK Format…….. **6-6**

6.3 .JOB Format……. **6-8**

6.4 .SYM Format…… **6-12**

6.5 .SUM Format…… **6-16**

6.6 .DXF Format……. **6-17**

7. Error Messages……. **7-1**

8. System Parameters

8.1 *Auto*NEST Systems Files…… **8-1**

1. Introduction

Thank you for purchasing ***Auto*NEST**.

***Auto*NEST** is addressed to the common problem faced in a number of industries where repetitive or non-repetitive parts have to be cut economically from given stock sheets. This optimization requirement is often encountered in industries such as shipbuilding, aerospace, sheet metal, garment manufacture, furniture work, etc.

While each different industry may have its own characteristics, the underlying objective of the manufacturer is to maximize utilization and minimize material wastage through judicious layout of parts.

A part's geometry is input in a simple *TEXT* ***VEC*** file format or in the AutoCAD ***DXF*** format.

Through a Task editor (***TaskEdit*** command), you can define your nesting requirements, i.e.: stock sizes, quantity of each stock size, parts to be nested , quantity and grain orientation of each part, cutting gap and so on. Taking into consideration these parameters, *Auto*NEST will search through the numerous possible arrangements and present near-optimum layout solutions.

*Auto*NEST assists the fabricator in maximizing material utilization and reduce drastically the time taken to plan a layout.

The program has been highly optimized to provide the shortest run time, a fraction of the time of what it would have taken manually.

*Auto*NEST features a single intelligent nesting engine - **NestPRO** to handle all your nesting jobs.

*Auto*NEST allows the incorporation of an "intuition" factor from the experienced designer so as to take into consideration the practical features only known by the designer. Nested layouts can readily be edited through AutoCAD or any CAD system for the best final layouts.

2. Operating System Requirements

***Auto*NEST** can run on machines with Windows operating systems.

Minimum Hardware Configuration

- Pentium-based PC or compatible
- Minimum 512 MB RAM
- CD-ROM drive
- Hard Disk with minimum 20 MB free disk space for software
- Parallel port or USB Port for hardware lock.

Operating Environment Requirements

- Microsoft Windows XP or newer.
- CAD software that reads DXF files
- AutoCAD – optional (R14 or higher)

3. Program Installation

*Auto*NEST must be installed onto a hard disk.

During installation, you can specify the directory in which to download *Auto*NEST. By default, the directory is C:\ANEST

The user is cautioned that *Auto*NEST should always be installed by the installation program. If a change in directory is required, the user is advised to re-install the whole software again. Please ensure that all important data has been backed-up prior to the new installation.

For the program installation, reference is made on the following assumptions:

C: Drive as the target drive where *Auto*NEST is downloaded.

E: Drive is the source drive.

C:\ANEST as the directory where *Auto*NEST is loaded.

The program installation process involves 3 steps

a. Connect the hardware lock

b. Install the software from the CD-Rom onto the hard disk

c. Setting up the working environment - ***Sysdata***

3.1 Hardware Lock

Enclosed with your manuals and diskettes is a small device with an electrical connector at each end. This device is a "hardware lock" and without it being properly attached to your computer, the program cannot execute.

Please note that only **ONE** hardware lock will be supplied with each *Auto*NEST package. If the device is **lost**, **stolen**, or **totally destroyed**, it will be necessary to purchase another copy of the *Auto*NEST software to replace it. It is therefore recommended that you insure the device, just like any other piece of computer equipment, for its replacement cost, namely the full price of your *Auto*NEST program.

Should your hardware lock be damaged or otherwise fail in service, contact your *Auto*NEST dealer. You will need to return the original in order to receive a replacement.

The license agreement allows you to use a copy of your program on as many computers as you wish, provided that you use it on only one computer at any one time. If you use the program on more than one computer, you will need to remove the hardware lock from one computer to connect it to another.

When installing your hardware lock, the end that has 25 pins sticking out should be attached to your computer's parallel printer (LPT1) port connector. Any peripheral device (such as a printer), that you wish to connect to the computer's parallel port should instead be connected to the other end of the hardware lock.

For almost all computers, you should attach the hardware lock directly to the connector of the computer with no intervening cable or adapter. Some clones may also have the wrong gender connector on the back of the computer. In such a case, you may need a "gender changer" available from your computer distributor. It is also possible to connect a "straight-through" full 25-pin cable between your computer and the hardware lock if it is required for physical flexibility.

The hardware lock will be "invisible" to any program but the *Auto*NEST program. You need not remove the hardware lock in order to run other programs. Attempting to execute an *Auto*NEST program without a properly attached hardware lock will result in a program abort with the message:

The hardware lock has been disconnected, removed or fails in service.

1. **If hardware lock has been removed or loosened, please attach the hardware lock to the computer's parallel port connector.**
2. **Install the hardware lock driver from the CD-Rom, if you have not done so.**
3. **Should the hardware lock be damaged, please report to your dealer.**

The same message will be displayed if the hardware lock has been disconnected, removed or fails in service. The program will not continue until the lock has been replaced.

3.2 Hardware Lock Replacement Policy

- Locks found to be faulty within 9 months of purchase will be replaced at no charge. Shipping and handling charges however will be borne by the user.

- Damaged locks will be replaced at US$150.00 per lock.

- The faulty lock must be returned before the replacement lock is dispatched.

- Should locks be lost, stolen or destroyed, the holder will be responsible for the full **retail cost of the software**.

3.3. Software Installation

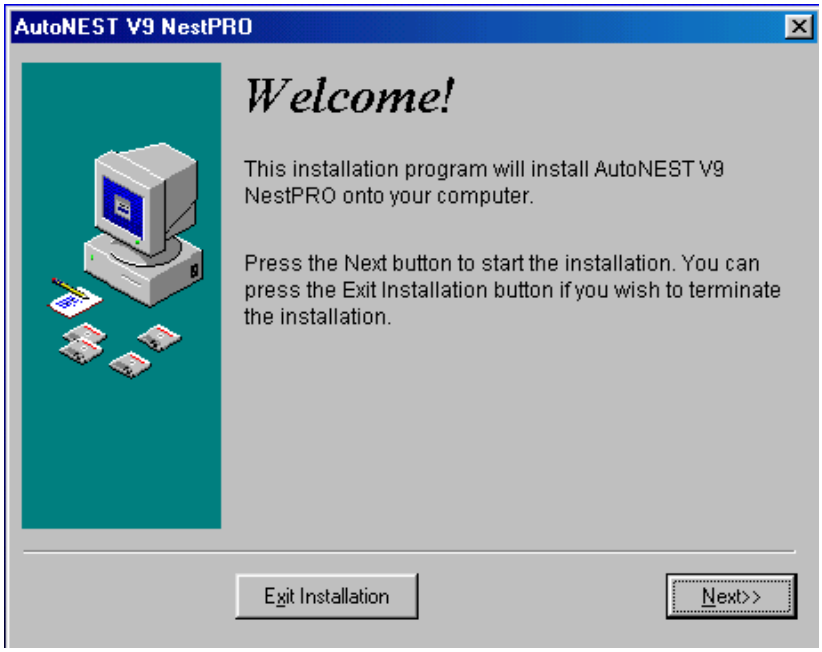
1. To begin, insert the *Auto*NEST Installation CD-ROM into the drive of your computer. The following assumptions are made :-

   E: is your source drive
   C: is your target drive

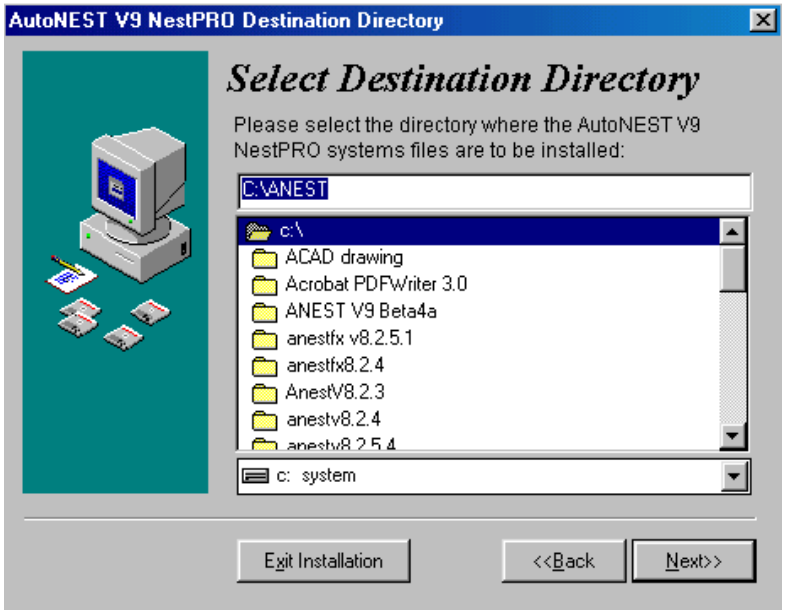
   Click the ***Start*** button at the lower–left corner of your screen and select ***Run***… . Windows will prompt you for the name of an application to run; type the command:

   E : Setup <Enter> (where E is your CD Rom drive)

   The installation wizard will guide you step by step through the complete installation of *Auto*NEST.

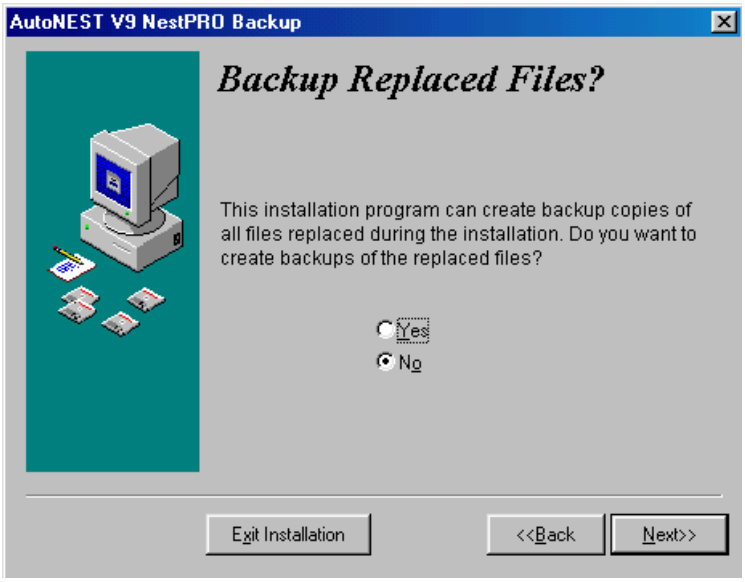

AutoNEST V9 NestPRO
Welcome!
This installation program will install AutoNEST V9 NestPRO onto your computer.
Press the Next button to start the installation. You can press the Exit Installation button if you wish to terminate the installation.
Exit Installation
Next>>

Click button to start the installation.



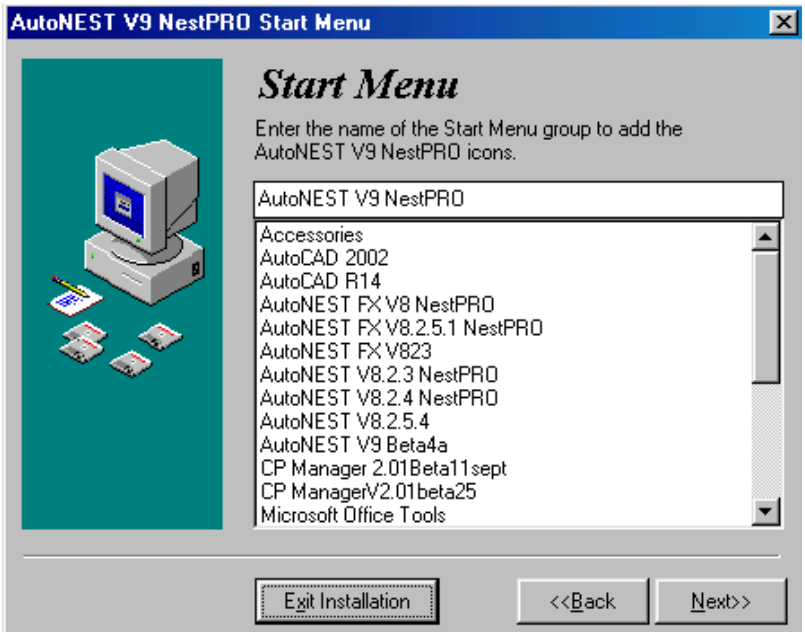
2. Enter the drive and directory name to indicate the location where you wish to install the *Auto*NEST program. Click < Back to return to previous page or Next > to continue. The default directory is **C:\ANEST**.

3. If the directory that you have selected is existing, the following dialog box will appear otherwise skip this step (3) and steps 4 and 5.


AutoNEST V9 NestPRO Backup
Backup Replaced Files?
This installation program can create backup copies of all files replaced during the installation. Do you want to create backups of the replaced files?
Yes
No
Exit Installation
<<Back
Next>>

4. Click the "**Yes"** radio button if you have an old copy of *Auto*NEST in the destination directory and you do not want to overwrite it. Otherwise select the "**No"** radio button.

5. If you have selected "**Yes**" in the previous dialog box, the above dialog box will appear. Type in or browse to specify where you want to store the backup files. Click the Next > button after specifying the destination directory.



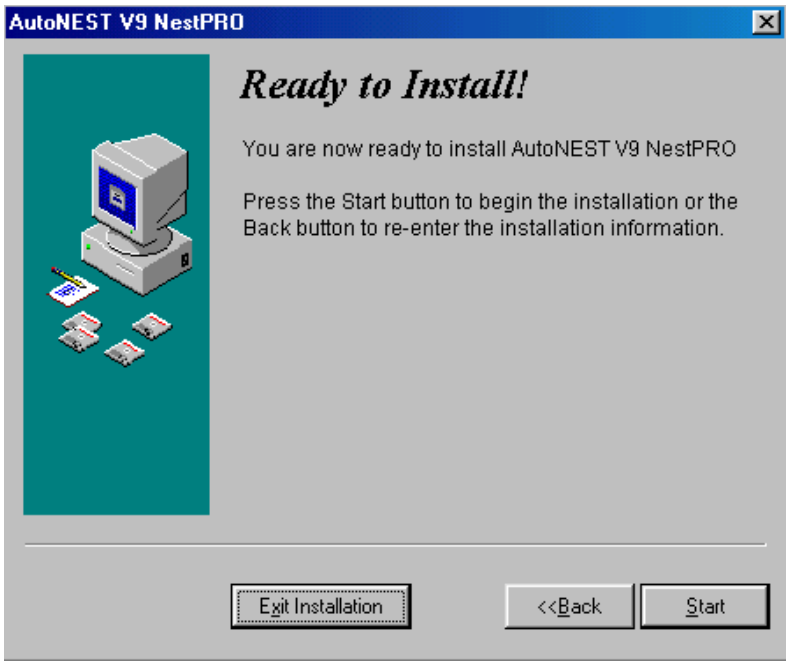
6. By default, the program name is "***Auto*NEST V9 NestPRO**". This name will appear at the Windows **Start→ Programs**. Click Next > to proceed to the next step. Otherwise if you like to change, please indicate the (new) program name here. For eg. ***AutoNEST V9***.

AutoNEST V9 NestPRO Operating Environment
Select AutoNEST V9 NestPRO Operating Environment
The Installation program can install AutoNEST V9 NestPRO to run under Nest Manager or AutoCAD Environment.
AutoNEST under Nest Manager
AutoNEST under AutoCAD R14 Windows
AutoNEST under AutoCAD 2000x Windows
Exit Installation
<<Back
Next>>

7. Next, select the appropriate *Auto*NEST operating environment. *Auto*NEST can be installed to run on the AutoCAD environment or as an independent Windows application.

Note: If you select the AutoCAD environment, the installation program will automatically detect the directory where AutoCAD R14 or later versions is installed.

8. Next, confirm the directory where *Auto*NEST is to be installed and the directory where AutoCAD is detected. You may use any of th Browse.. buttons to change the directories indicated in the edit boxes. This feature is helpful if the wrong copy of AutoCAD is being detected (this could happen if there is more than one versions of AutoCAD on the system). Select Next > to proceed with the installation.


AutoNEST V9 NestPRO
Ready to Install!
You are now ready to install AutoNEST V9 NestPRO
Press the Start button to begin the installation or the Back button to re-enter the installation information.
Exit Installation
<<Back
Start

9. Once you click the

button, the installation process will begin. However if the

button is selected, it will revert to the previous page.

4.1 Getting Started

This section of the documentation makes reference to the use of *Auto*NEST in conjunction with AutoCAD. AutoCAD is a commonly used CAD graphics engine to graphically display *Auto*NEST nested results and output reports.

It is also equally feasible to run *Auto*NEST independently under the Windows environment through the **Nest Manager** Icon Menu. The Nest Manager will be explained in greater detail in the Chapter 5.

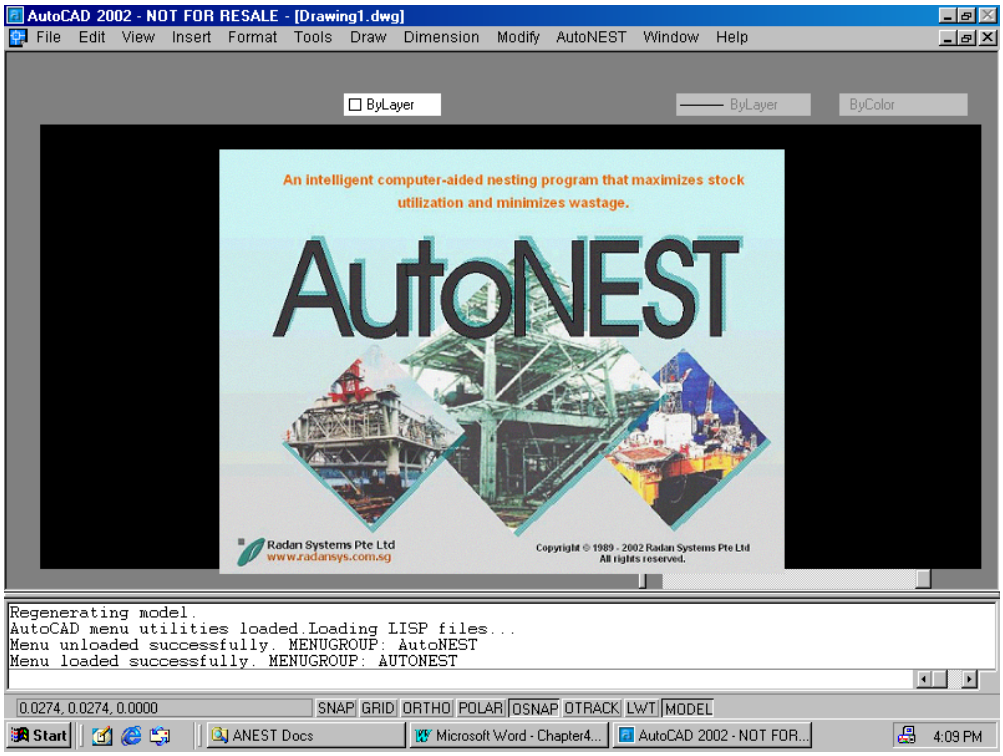
4.1.1 *Auto*NEST Process

The step-by-step workflow of *Auto*NEST in the AutoCAD environment is as follows:

(1) Starting *Auto*NEST

To run **AutoNEST**, click the ***Start*** button (located at the lower-left corner of screen) of your Windows and select ***Programs*** → **AutoNEST for AutoCAD 200X.**

This will launch AutoCAD and AutoNEST. Next, you will see an additional pulldown menu titled "**AutoNEST**", located between the "Modify" and "Window" pulldowns.


AutoCAD 2002 - NOT FOR RESALE - [Drawing1.dwg]
File Edit View Insert Format Tools Draw Dimension Modify AutoNEST Window Help
ByLayer
ByLayer
ByColor
An intelligent computer-aided nesting program that maximizes stock utilization and minimizes wastage.
AutoNEST
Radan Systems Pte Ltd
www.radansys.com.sg
Copyright © 1989 - 2002 Radan Systems Pte Ltd
All rights reserved.
Regenerating model.
AutoCAD menu utilities loaded.Loading LISP files...
Menu unloaded successfully. MENUGROUP: AutoNEST
Menu loaded successfully. MENUGROUP: AUTONEST
0.0274, 0.0274, 0.0000
SNAP GRID ORTHO POLAR OSNAP OTRACK LWT MODEL
Start
ANEST Docs
Microsoft Word - Chapter4...
AutoCAD 2002 - NOT FOR...
4:09 PM

(2) Create Parts

Using AutoCAD interactive *DRAW* commands, the user can construct the geometry of each part that needs to be nested. Use the ***SavePart*** or ***MirrorPart*** commands to save each part.

(3) Create Task

This is the task definition stage. Through Windows dialog boxes, the particulars of parts required to be nested onto specified stock sheets are specified. Details such as edge allowances, cutting gaps and other nesting criteria are being specified here. The command name is ***TaskEdit***.

(4) Nesting

After having defined the nesting requirements in the previous stage, ***Nesting*** can now be invoked to compute the layout solutions. The resulting layouts are automatically converted into ***DXF*** format and displayed onto the current AutoCAD session. Two text files are also generated to reflect the nesting results.

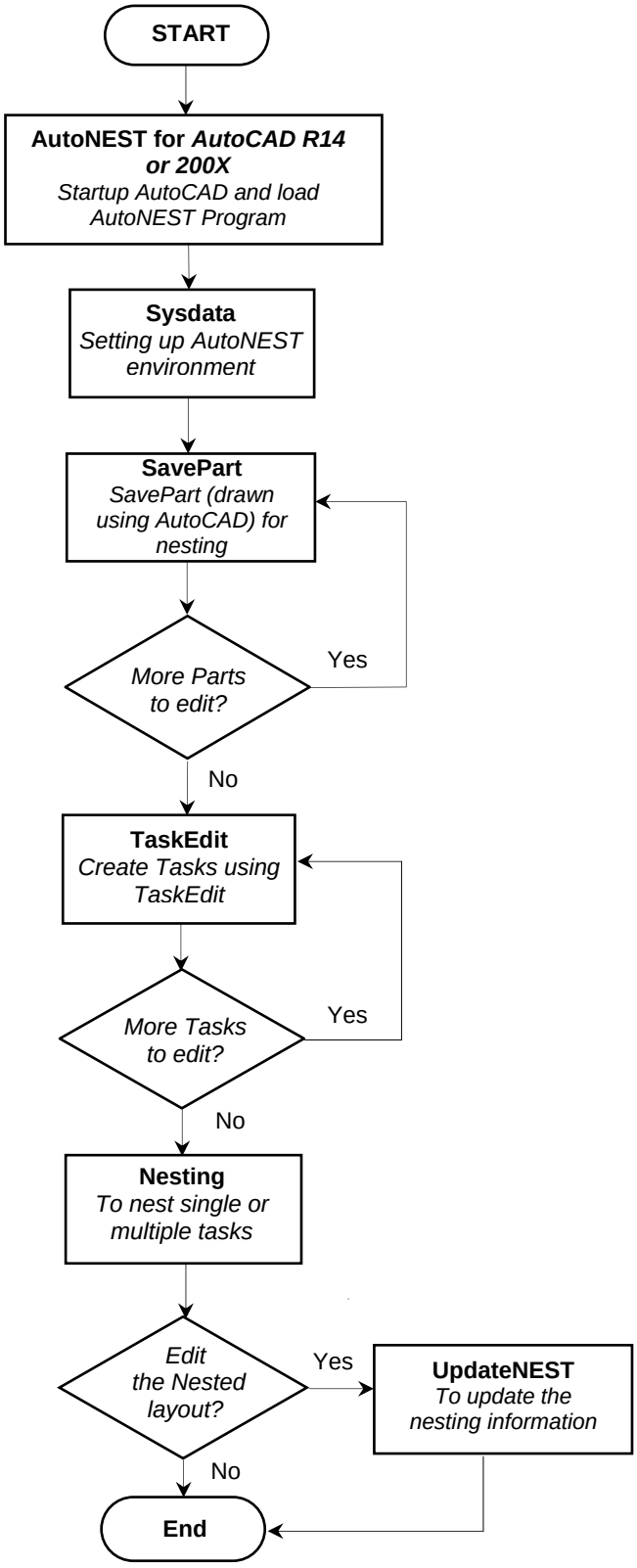
(5) Update

Once a nested layout is displayed onto the current drawing, you can further edit it based on your better judgement and experience using AutoCAD's move, copy, rotate or delete commands. This process will be invisible to *Auto*NEST, as such *Auto*NEST needs to be "updated" so that new utilization percentages of the stock sheet can be displayed. This is achieved via ***UpdateNEST*** command.

(6) ViewNEST

This command allows you to review layouts of previously nested tasks within current Task/ Parts directory.

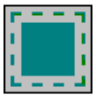
Flow Chart of AutoNEST Process



4.1.2 *Auto*NEST Features

Below is a list of *Auto*NEST commands available within the AutoCAD environment.

Sysdata - Environment Settings.	
	Sysdata To set environmental settings for running *Auto*NEST.

Part	
	SavePart To save a Part which you have constructed or drawn using AutoCAD *DRAW* commands.
	ConvertPart To convert DXF files to Parts (.VEC). As well as from Part (.VEC) files to DXF format.
	ViewPart To view a saved Part, click this icon. At the AutoCAD command prompt you will be able to view a part in either .DWG /.DXF /.VEC formats.
	MirrorPart Besides saving a part which you have constructed or drawn using AutoCAD *DRAW* commands, ***MirrorPart*** command will also save a mirror of the part with a user-definable name.
	***ExpandPart*** To create a part with an expanded profile on the AutoCAD screen. If the part is expanded with the cutting gap, this command can help you to manually edit the layouts by fitting the part onto some available space.

Irregular Stock	
	SaveIrStock To save an irregular stock which you have constructed or drawn using AutoCAD *DRAW* commands
	ConvertIrStock To convert DXF files to irregular stocks (.stk). As well as from irregular stock (.stk) files to DXF format.
	ViewIrStock To view a saved irregular stock, click this icon.

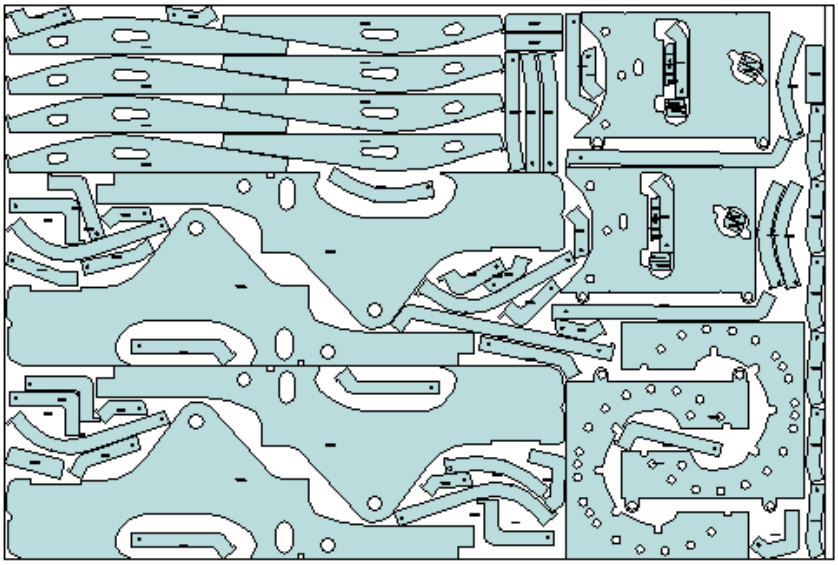
Task Edit	
	TaskEdit To specify or edit a "task" by specifying a list of parts and stocks to be nested and the associated parameters of the nesting requirements

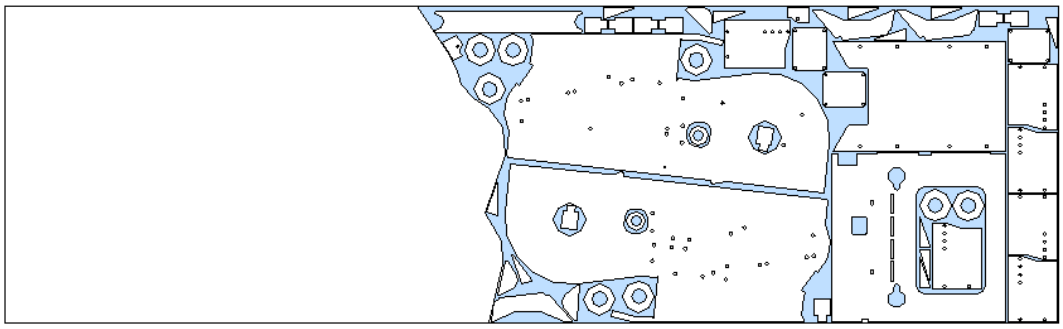
Nesting and ViewNEST	
	Nesting To nest one particular task and to display the nested layout.
	Batch Nesting To nest multiple tasks in one go.
	ViewNEST To view the nesting layouts of previously nested tasks.
	UpdateNEST To update the nested layouts after editing

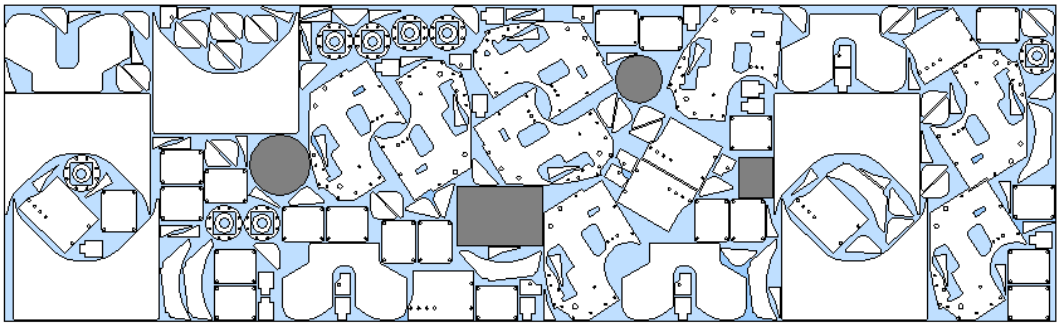
On-line Help	
	On-line Help To view on-line help file, click this icon.

About	
	About To view the version of the program, click this icon.

Samples of typical nested layout:



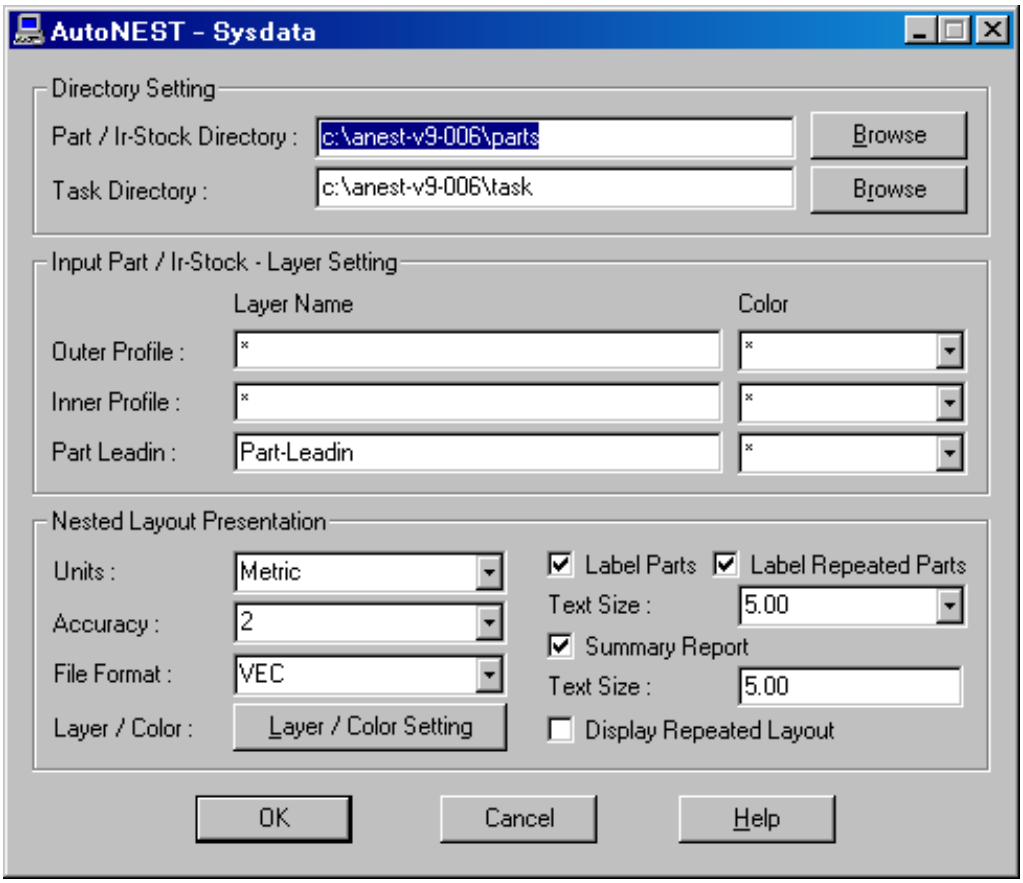




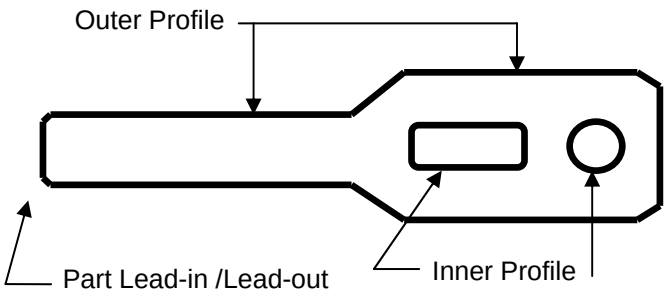
4.2 Sysdata

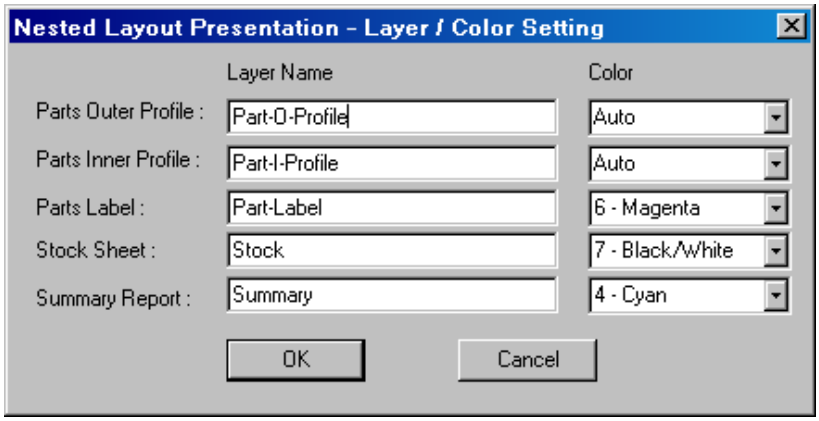
Sysdata is an important command to set the working environment for running *Auto*NEST. Before you begin to work with any of the other *Auto*NEST commands, it is recommended that the ***Sysdata*** command be activated to set the working environment.

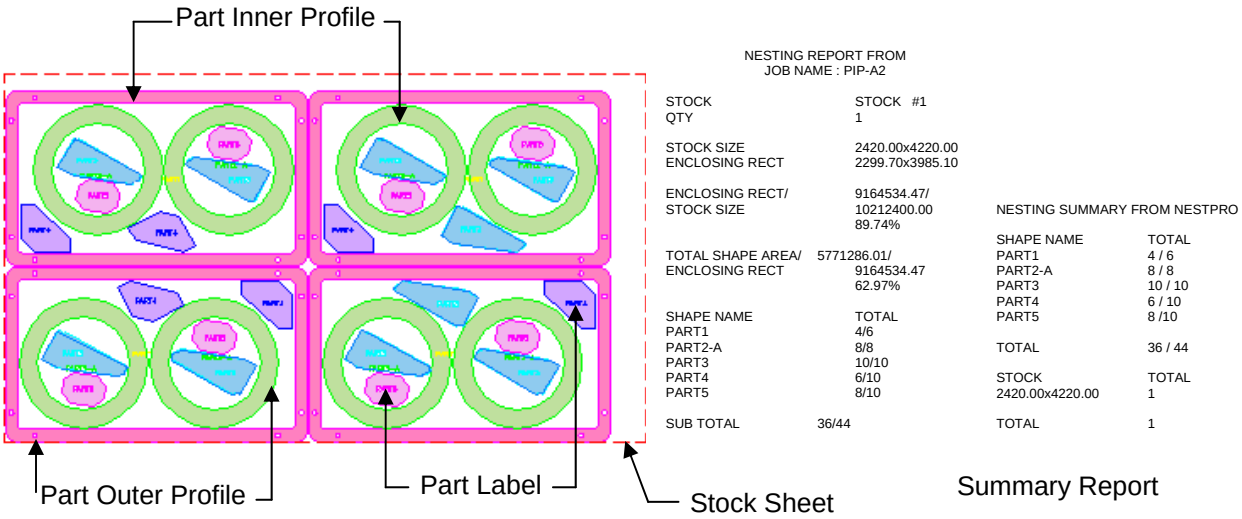
Select the ***Sysdata*** command and the following dialog box will be displayed.



Directory Setting	
Parts/ Ir-Stock Directory	To type in or click the Browse button to choose a directory where your parts and irregular stocks are to be located. (The directory or sub-directory must be created first)
Task Directory	To type in or click the Browse button to choose a directory where your tasks are to be located. (The directory or sub-directory must be created first)

Input Part /Ir-stock – Layer / Color Setting	
Outer Profile **Inner Profile** **Part Leadin**	These are the layer, color and part leadin/leadout "FILTER" settings that you can specify for both ***SavePART*** and ***DXF2VEC*** commands. These settings are especially helpful if the parts that you are saving or converting contain marking lines that touch or intersect the external /internal profiles of the shapes. By specifying the layer/ color/ part leadin filters, you will help ***SavePART*** and ***DXF2VEC*** commands to differentiate profiles that are crucial to nesting (outer and inner profiles of the part) against those that are not (markings or folding lines).  You can specify more than ONE colors in the "Color" field by entering for example "1,3" for colors 1 and 3 (separated by a comma)
Nested Layout Presentation	
Units	The units setting of inputs and outputs. There are 4 choices to choose from :- Metric Architectural Imperial (1' 3-1/4") Decimal Imperial (15.25") Engineering Imperial (1' 3.25")
Accuracy	The number of decimal places or the number of digits to the right of the decimal point (0 to 4). If the units chosen above is Imperial, the denominator of the fractions or the accuracy will be expressed as follows:- 1 for full integers, no fractions 2 for 1/2" (half) 4 for 1/4" (quarter) 8 for 1/8" (eighth) 16 for 1/16' (sixteenth)

File Format	This option decides which part file format is to be used when generating graphical nested layout on screen. Three choices are available : ***DWG*** ***VEC*** ***DXF*** If you have chosen VEC format, please note the "Nested Layout – Layer Settings" (click the "Layer Setting" button) to define the layers and colors of the nested layout. If you have chosen DXF or DWG format, the nested layouts will display the layers/ colors of your parts as they were originally created.
Layer / Color **Parts Outer Profile** **Parts Inner Profile** **Parts Label** **Stock Sheet** **Summary Report**	The following dialog box will appear when you click this button -  User can define the layer and color for Part Labels, Stock Sheet and Summary reports. **PARTS** If the ***Sysdata*** "File Format" is VEC, the Parts displayed on the nested layout will follow the layer and color settings here. If DWG or DXF "File Format" are chosen, the Parts' layer and color settings will be exactly the same as they were originally saved. See diagram below for explanation of each of the names.



Label Parts **Text Size**	Mark this checkbox if you wish to display Part Label. And set the Text size of the Part label when displayed on screen. To change the layer/ color of the Part labels, click the "**Layer/ Color Setting**" button
Label Repeated Parts	Mark this checkbox if you wish to add a part Label on each and every part on the nested layout. When this checkbox is un-marked, when there are say 10 parts of the same name nested, only ONE of the 10 is being labeled.
Summary Report **Text Size**	Mark this checkbox if you wish to display Summary Report. And set the Text size of the Report when displayed on screen. (The summary report is always displayed next to the lower right-hand corner of the nested layout) To change the layer/color of the Summary Report, click the "**Layer/ Color Setting**" button
Display Repeated Layout	Mark this checkbox if you wish to display the same nested layout repeatedly.

4.3 Parts

Introduction

This section introduces five commands related to ***PART*** within the AutoCAD environment. They are used to save, expand or view parts that have been drawn or edited using AutoCAD commands. In addition, .DXF files can be converted into Parts as well.

	SavePart To save the geometry of a part in .DWG, .DXF and .VEC file formats
	ConvertPart To convert DXF file format to Part (.VEC) and vice versa.
	ViewPart To view a part in .DWG, .DXF and .VEC file format within AutoCAD
	MirrorPart To save a part and the mirrored part in .DWG, .DXF and .VEC file formats.
	ExpandPart To display a part with an expanded profile by an offset equal to the cutting gap.

4.3.1 SavePart

Parts are generally components that have been constructed or drawn using AutoCAD ***DRAW*** commands. Once parts are designed and drawn with AutoCAD, ***SavePart*** command can be used to save the parts under the part directory as specified in ***Sysdata***.

Within the AutoCAD drawing session where the parts to be nested had already been drawn, select the ***SavePart*** command either from the *Auto*NEST pulldown or icon menu. The following prompts will appear sequentially at the command prompt:

Save Part :
Parts Name <> :
Require to save holes in Part? (Y/N) <Y> :
Insertion Pt :
Select objects :

Parts Name <> :

This is to prompt for the name of the new part. (max. no. of characters - 31, both the space and dot characters are not accepted)

File already exists. OK to overwrite? (Y/N): <N>

This prompt will be displayed if the entered part name already exists.

Require to save holes in Part? (Y/N) <Y>:

This will enable the ***SavePart*** command to save internal profiles of a part as holes, which may be used to nest other parts.

Insertion Pt:

This is the pick-up point of the part as well as the location for label or tag of the part. Insertion point is recommended to be one of the vertices of the part or within the geometry of the part. AutoCAD object-snap modes under the ***OSNAP*** command, such as ***Endp*** or ***Midp*** are allowed.

Select Objects:

The Entity Select modes of AutoCAD are applicable here. You can type **W** (Window), **C** (Crossing), **R** (Remove) or simply pick the required entities to be saved as part.

If **W** (Window) is entered at this stage, a dynamic window will be formed to enclose the relevant geometry of the part. All the entities within the window will be saved as an *Auto*NEST part.

During ***SavePart,*** the following happens:

a) ***. VEC*** , ***. DWG,*** and ***. DXF*** files are created, where :

- ***VEC*** is a text file which record geometric information for a part, such as x, y coordinates of vertices, bulge values for arcs, center point, coordinates and radius for circles.
- ***DWG*** is the type of file format given by AutoCAD when a part is saved as ***Block/WBlock***. This is to keep a true copy of the part geometry submitted to *Auto*NEST.
- ***DXF*** is a Drawing Interchange File format to assist in interchanging drawings between AutoCAD and other programs.

b) Text and dimensioning information are filtered out in the ***.VEC*** file but are retained in the ***.DWG*** and ***.DXF*** files for final presentation.

Conditions for Part Profile

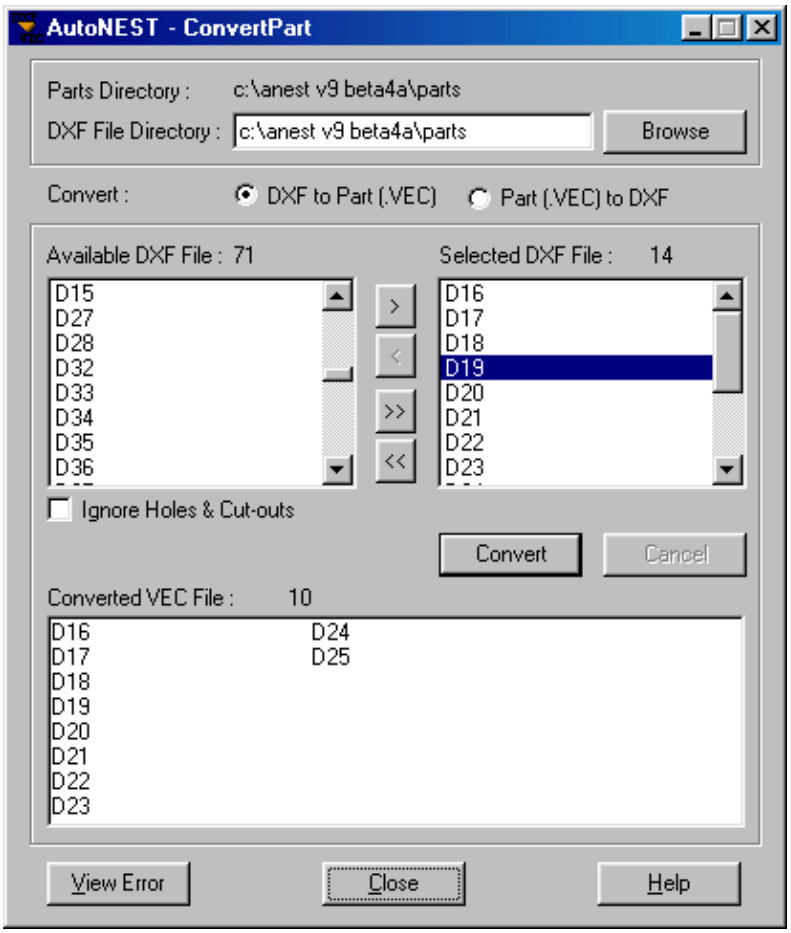
Acceptable	Unacceptable
• Lines, Arcs, Circle, Rectangle, Polyline, Polygon and Spline entities • External profile and internal holes profiles of a part must be closed. • Layer and Color of profile must be of as set in ***Sysdata***	• Block entity (acceptable if "**Explode**") • Pedit-Spline and Pedit-Fit (acceptable if "**Explode**") • Additional line/plines along the profile • Crossing over on each profile or between profiles • Part with more than 1500 vertices per profile (Inclusive of starting and ending vertices of arcs

4.3.2 ConvertPart

ConvertPart is a function that allows the user to convert part profile in DXF file format to Part (.VEC file format).

Similarly, it allows user to convert Parts (.VEC file format) back into DXF format.

Select the ***ConvertPart*** command icon from the icon menu within the AutoCAD drawing session. The following dialog box will appear:



Each dialog box input option is described in the following listing:

Parts Directory	Display the default part directory set at ***Sysdata*.** In this case, it is also the target directory where all converted file will be saved.
DXF File Directory	To type in or click on the Browse button to choose a directory where the source file are located.
Convert DXF to Part (.VEC)	Check this radio button to convert DXF file format to Part (.VEC).
Convert Part (.VEC) to DXF	Check this radio button to convert Part (.VEC) file format to DXF.
Available DXF/VEC File	Display a list of available files found in the Part Directory (This will depends on which conversion has been chosen). You can select one or more files to be converted by highlighting the filenames and then the > button or >> button to select all files.
Selected DXF/VEC File	Display a list of files selected for the conversion. You can select the filenames and click the < button to remove the files from the "Selected Parts" list (but the files still remained on the "Available Parts" list) Or click the << button to remove all files. Click the Convert button to initiate the process of conversion.
Ignore Holes and Cut-outs	If this check box is marked, holes and cut-outs will not be converted.
Converted VEC/DXF File	This will show files that have been converted successfully.
View Error	Click this icon to view error messages, if any. This is especially helpful as it will give a list of the filenames that cannot be converted for certain reasons.

4.3.3 ViewPart

This provides the facility to view previously created Parts stored in the default directory. If necessary, you can ask for a listing of all the ***DWG, DXF and VEC*** parts within the directory. As ***DWG*** parts are stored as AutoCAD's ***BLOCKS***, they will be recalled very much the same way as AutoCAD's ***INSERT*** command.

The following will appear sequentially at the AutoCAD command prompts:

ViewPart
Select part format to view –
Dwg\dXf\Vec <Vec> :
Insertion Pt:
Part Name (? for list)<>:

Select part format to view – Dwg\dXf\Vec <Vec>:

This is to prompt for the type of file format that you wish to view.

- "D" for Dwg
- "X" for Dxf
- "V" for Vec.

"Enter" for the default option, in this case the VEC file format.

Insertion Pt:

Pick a point on the screen. The specified part will be displayed at the insertion point on the screen.

Part Name (? for list)<>:

This is to prompt for the name of the part, which you wish to review.
Enter the required part name.

Conversely, you can enter ***?***, which in turn will display a dialog box for you to select the part name.

CAUTION:

Each *Auto*NEST part saved using ***SavePart*** will internally be stored as an AutoCAD block. This may pose a problem where in the current drawing, different blocks are referred by the same name. For example, if the name of a Part that you are viewing happens to be the same as one of the Blocks in the current drawing. In this case, a copy based on the block in the current drawing will be inserted. This is all right if they are actually of the same geometry. Otherwise, one may get very confusing results. (*Auto*NEST allows same names of ***Wblocks*** as long as they are in different directories or sub-directories.)

This situation can even be more baffling if the existing Blocks have been erased from the current drawing yet AutoCAD remembers them in the drawing! This will of course result in the wrong part being displayed.

The problem can be eliminated to a certain extent if unused blocks are purged from the drawing (AutoCAD ***PURGE*** command). This is the only way AutoCAD removes completely unused blocks. Starting a fresh new drawing will also help.

An experienced AutoCAD user will know how to avoid this pitfall.

4.3.4 MirrorPart

MirrorPart is basically the same as ***SavePart*** except in this case, for every part saved, an additional mirrored image of the part will be saved as well.

Likewise, the user has to draw the part with AutoCAD before the ***MirrorPart*** command can be used.

The following will appear sequentially at the AutoCAD command prompt:

MirrorPart : Part Name <>: *TEST1*
Require to save holes in Part? (Y/N)<Y>:
Insertion Pt:
Select objects:

For example, the program will save the original part under the name "*TEST1*". Subsequently the following prompts will appear:

Parts Name <>:

This is to prompt for the name of a new part. Part names are limited to 31 characters long (space and dot characters are not accepted).

File already exists. OK to overwrite? (Y/N): <N>

This prompt will be displayed if the entered part name already exists.

Require to save holes in Part? (Y/N) <Y>:

This will enable the ***SavePart*** command to save internal profiles of a part as holes, which may be used to nest other parts.

Insertion Pt:

This is the pick-up point of the part as well as the location for label or tag of the part. Insertion point is recommended to be one of the vertices of the part or lies within the geometry of the part. AutoCAD object-snap modes under the ***OSNAP*** command, such as ***Endp*** or ***Midp*** are allowed.

Select Objects:

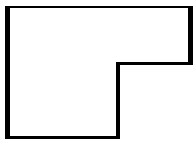
All the Entity Select modes of AutoCAD are applicable here. You can type ***W*** (Window), ***C*** (Crossing), ***R*** (Remove) or simply pick the required entities to be saved as a part.

If W (Window) is entered at this stage, a dynamic window will be formed to enclose the relevant geometry of the part. All the entities within the window will be saved as an *Auto*NEST part**.**

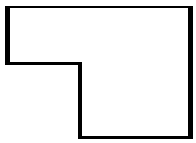
Part Name <_MTEST1>:

By default, the mirror image is given the same name as the original part but pre-fixed with **"_M".** The user has the option to rename it if required.

Example of a part saved by ***MirrorPart*** is shown below:



Part Drawn



Part Mirrored & Saved

4.3.5 ExpandPart

The nested layout displayed after the nesting process in the current AutoCAD session may be edited as a normal AutoCAD drawing. During an editing session of a nested layout, you may wish to make use of a part with an expanded profile by an offset equal to the bridge width. This expanded profile of the part can assist you in manipulating the part to fit a tight corner or space.

When ***ExpandPart*** is invoked, the following will appear sequentially at the AutoCAD command prompt :-

Part Expand:
Insertion Pt:
Part Name (? for list) <>:
Cutting Gap <>:

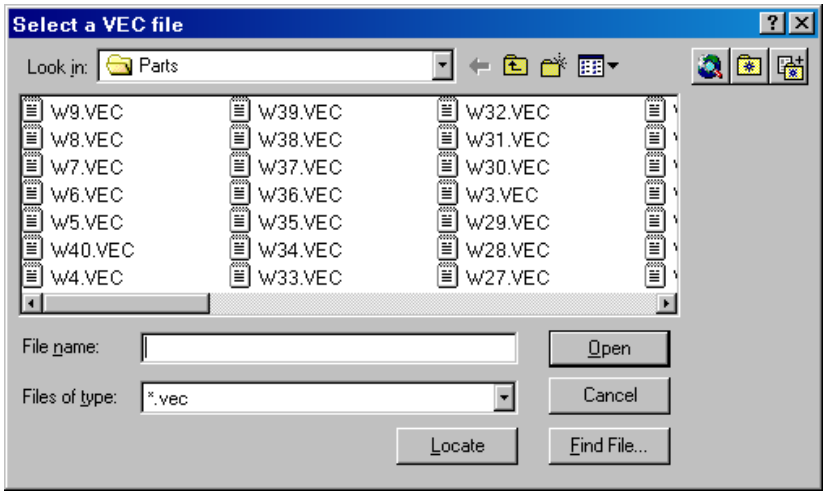
Insertion Pt:

This is to prompt the user the location of the (expanded) part. You can use the pointing device to digitize the screen location or point.

Part Name (? for list)<>

<> will have the name of the most recent entry of part name.

At the ***'Part Name (? for list)<>:'*** prompt, if the ***?*** option is chosen, the following dialog box is displayed :



Select a Part form the dialog box and click the "**Open**" button.

Cutting Gap:

The part will be expanded by the cutting gap as specified here.

Once the entries have been confirmed, ***ExpandPart*** will recall the part with an expanded profile. Again the user can now manipulate the part to fit onto the given stock sheet using AutoCAD ***Modify*** commands.

The user can then manipulate the part with ***MOVE, COPY, ROTATE***, etc commands of AutoCAD.

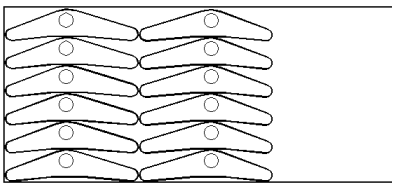
4.4 Irregular Stocks

Introduction

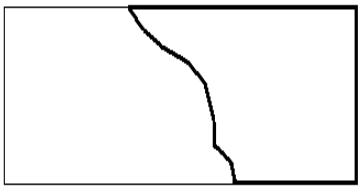
In AutoNEST, Irregular Stocks is a generic name used to describe the following :-

1. Irregular-shaped sheet for nesting
2. Layout with pre-nested parts
3. Remnant sheet /stock

Examples of Irregular-shaped sheet / stock



Example of Layout with pre-nested parts



Example of Remnant sheet / stock

This section introduces three commands related to ***Irregular Stock*** within the AutoCAD environment. They are used to save or view irregular stocks that have been drawn or edited using AutoCAD commands. In addition, .DXF files can be converted into irregular stocks as well.

Irregular Stocks will also be saved automatically when you marked the "**Save Remnant**" checkbox in the **Nest Options** within the ***TaskEdit*** dialog box. Please refer to Chapter 4.5, ***TaskEdit***. for details.

	SaveIrStk To save the profile of an irregular stock in .DWG, .DXF and .STK file formats
	ConvertIrStock To convert DXF file format to irregular stock (.STK) and vice versa.
	ViewIrStock To view an irregular Stock (.STK file) within AutoCAD

4.4.1 SaveIrStk

Similarly to Parts**,** an **Irregular Stock** can be constructed or drawn using AutoCAD ***DRAW*** commands. The ***SaveIrStock*** command can be used to save the irregular stock profiles into the Part / Ir-Stock directory as specified in ***Sysdata.***

When the command is selected either from the pulldown or the icon menu, the following prompts will appear sequentially at the command prompt:

Save Irregular Stock:
Irregular Stock Name <>:
Insertion Pt:
Select object:

Irregular Stock Name <>:

This is to prompt for the name of the new irregular stock. (Max. no. of characters - 31, both the space and dot characters are not accepted)

File already exists. OK to overwrite? (Y/N): <N>

This prompt will be displayed if the entered stock name already exists

Insertion Pt:

This is the pick-up point of the stock. Insertion point is recommended to be one of the vertices of the profile or anywhere inside the profile. AutoCAD object-snap modes under the ***OSNAP*** command, such as ***Endp*** or ***Midp*** are allowed.

Select Objects:

The Entity Select modes of AutoCAD are applicable here. You can type **W** (Window), **C** (Crossing), **R** (Remove) or simply pick the required entities to be saved as irregular stock.

If **W** (Window) is entered at this stage, a dynamic window will be formed to enclose the relevant geometry of the stock. All the entities within the window will be saved as an *Auto*NEST irregular stock.

During ***SaveIrStock,*** the following happens:

a) ***. STK*** , ***. DWG,*** and ***. DXF*** files are created, where :

- ***STK*** is a text file which record geometric information of an irregular stock, such as x, y coordinates of vertices, bulge values for arcs, center point, coordinates and radius for circles.

- ***DWG*** is the file format given by AutoCAD when an irregular stock is saved as a ***Block/WBlock***. This is to keep a true copy of the geometry submitted to *Auto*NEST.

- ***DXF*** is a Drawing Interchange File format to assist in interchanging drawings between AutoCAD and other programs.

b) Text and dimensioning information are filtered out in the ***.STK*** file.

Conditions for saving Irregular Stock profile

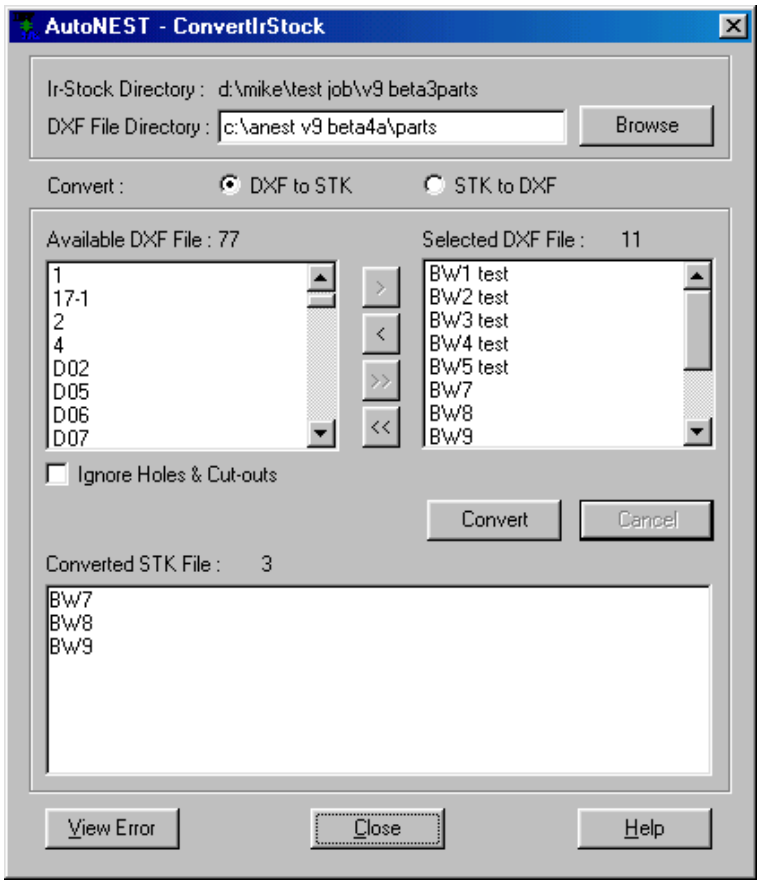
Acceptable	Unacceptable
• Lines, Arcs, Circle, Rectangle, Polyline, Polygon and Spline entities • External profile and internal holes profiles of irregular stock must be closed. • Layer and Color of profile must be as set in ***Sysdata***	• Block entity (acceptable if "**Explode**") • Pedit-Spline and Pedit-Fit (acceptable if "**Explode**") • Additional line/plines along the profile • Crossing over on each profile or between profiles • Part with more than 1500 vertices per profile.

4.4.2 ConvertIrStock

ConvertIrStk is a function that allows the user to convert the irregular stock profiles in *DXF* file format to irregular stocks (*.STK* file format).

Similarly, it allows user to convert irregular stocks (*.STK* file format) back into *DXF* format.

Select the ***ConvertIrStk*** command icon from the icon menu within the AutoCAD drawing session. The following dialog box will appear:



Each dialog box input option is described in the following listing:

Ir-Stock Directory	Display the default irregular stock directory set at ***Sysdata.*** The irregular stock directory is the same as the Parts directory. In this case, it is also the target directory where all converted .stk files will be saved.
DXF File Directory	To type in or click on the Browse button to choose a directory where the source file are located.
Convert DXF to STK	Select this radio button to convert DXF files to STK files.
Convert STK to DXF	Select this radio button to convert STK files to DXF files.
Available DXF/STK File	The available files in the directory. (This will depend on which option has been chosen). You can select one or more files to be converted by highlighting the filenames and then clicking the > button. By clicking the >> button, all the files in the directory will be selected.
Selected DXF/STK File	This list box displays the selected files for the conversion. You can unselect the filenames by clicking the < button to remove the files from the "Selected Parts" list (but the files still remain on the "Available Parts" list) or click the << button to remove all files. Click the Convert button to initiate conversion process.
Ignore Holes and Cut-outs	If this checkbox is marked, holes and cut-outs will not be converted.
Converted (STK/DXF) File	This will show files that have been converted successfully.
View Error	Click this icon to view error messages, if any. This is especially helpful as it will give a list of the filenames that cannot be converted for certain reasons.

4.4.3 ViewSTK

This provides the facility to view previously created irregular stocks stored in the default directory. If necessary, you can ask for a listing of all the filenames within the directory.

The following will appear sequentially at the AutoCAD command prompts:

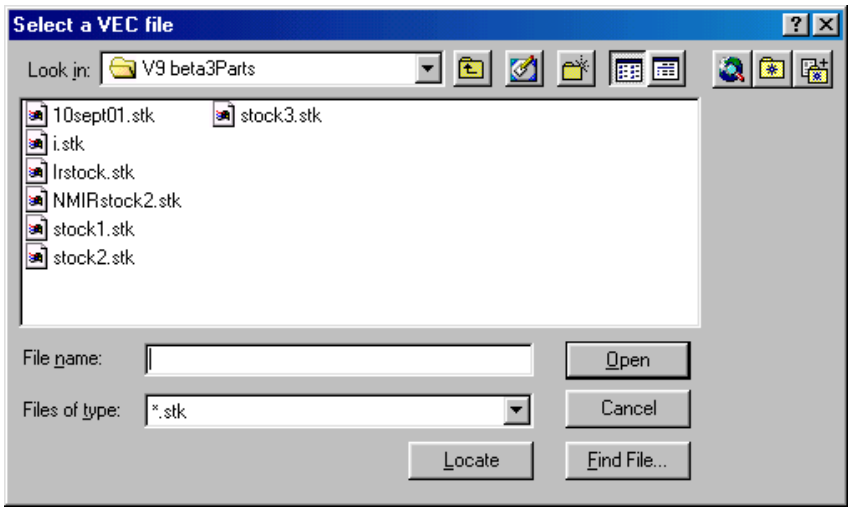
The screen prompts are:

View Irregular stock (.STK):
Irregular stock name (? for list) <>:
Insertion Pt :

Irregular stock name (? for list)<>:

This is to prompt for the name of an irregular stock in .STK file format that you wish to view. Enter the required stock name.

If you enter "***?"*** at the ***" Irregular stock Name (? for list)<>:"*** prompt, the following dialog box will be displayed. In this case, you can have access to all the .stk files in the default directory.



Insertion Pt:

Pick a point on the screen. The specified STK stock will be displayed at the insertion point on the screen.

4.5 TaskEdit

In ***TaskEdit***., three (3) categories of information are required:

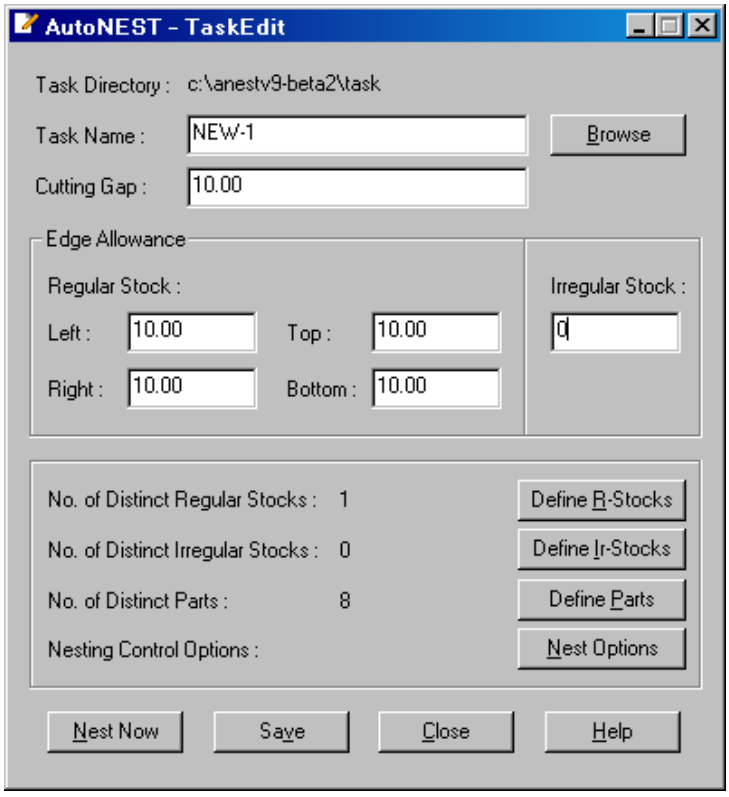
- Stock sheet (regular and irregular stocks accepted)
- Parts to be nested
- Nesting Conditions and Options

Stock sheet information includes the number of distinct stocks, size and quantity of each distinct stock. *Auto*NEST can handle both rectangular stocks of fixed size and irregular-shaped stock sheets. For tasks that nest **one** part with fixed quantity, *Auto*NEST will allow "stretchable" rectangular stocks in rolls or reels.

Information relating to the number of parts, the quantity to be nested for each part and orientation constraint …etc will also be defined in ***TaskEdit***. Cutting information such as cutting gap, x-y edge allowances are also definable.

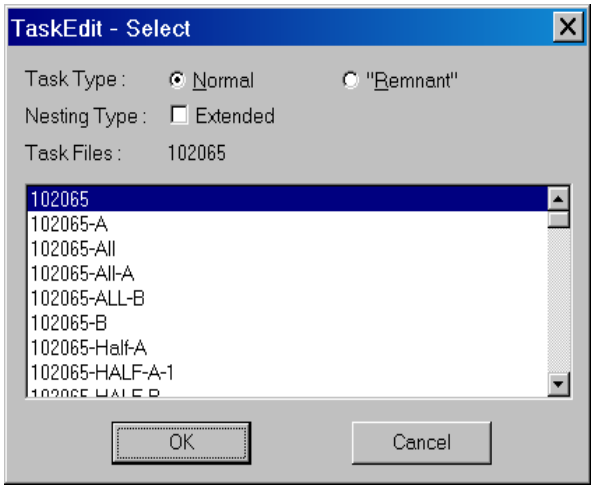
There is a new "**Nest Now**" button within the dialog box for nesting. Instead of clicking the ***Nesting*** command, the user can create/ edit Tasks and go direct into nesting.

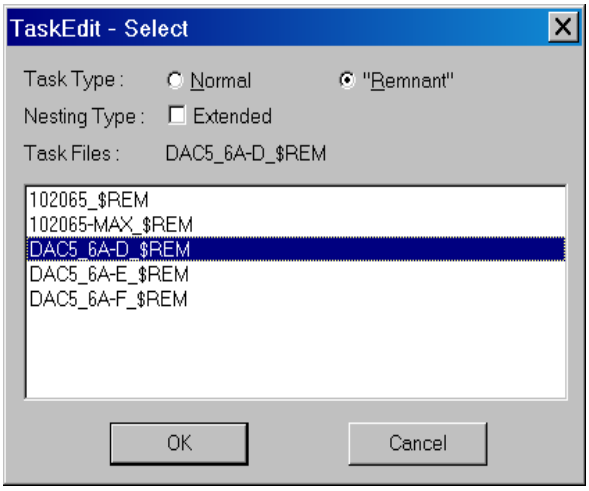
Select the ***TaskEdit***. command either from the icon menu or the *Auto*NEST pulldown menu. The following dialog box will appear:



Explanation of the ***TaskEdit*** dialog box is given below:-

Task Name	Each task is given a user-specified name for future reference (.job). You can enter up to max. 31 characters (space and dot characters are not accepted). Enter a new task name or click Browse to select an existing task. You will see the Pop-Up Window below (left). Select the task file and click the OK button. Click the "**Remnant**" radio button and you will see the Pop-Up Window (right). Display in this list box are all task names with the suffix "_$REM". You can change the existing specifications and save the new specifications into a new name or overwrite using the same task file name.



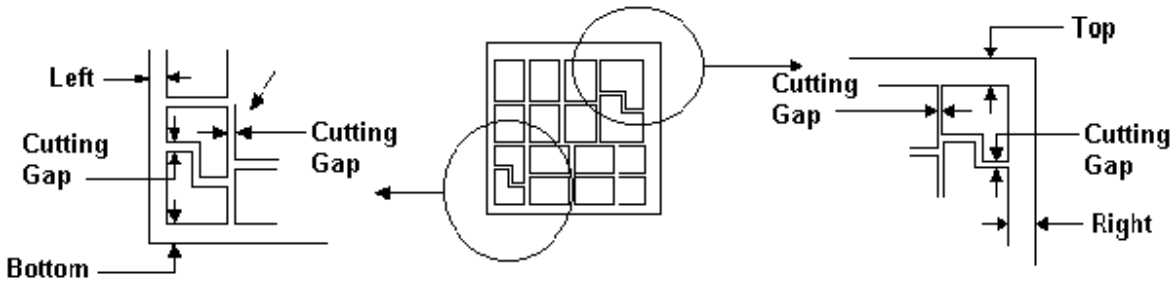


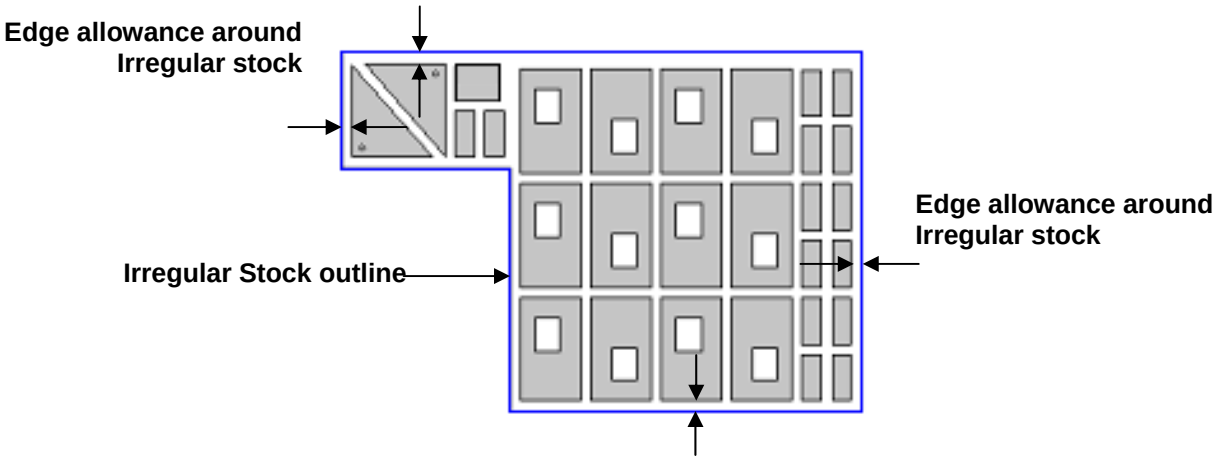
Task Type	Referring to the pop-up windows below, there are 2 selections :- • Normal • Remnant "Normal" tasks refer to all task files (*.job) created by the user. "Remnant" tasks refer to tasks files (*.job) with the reserved suffix, "_$REM" . For example : XYZ_$REM.job. These tasks are created automatically when the "**Save Remnant**" checkbox is marked in the NEST OPTIONS of ***TaskEdit*** ("Nest Options" button is located at the lower-right corner of the dialog box).

Nesting Type	By default, the **Extended** check box is un-marked which means that the nesting will run its usual course. If the **Extended** check-box is marked, then the nesting time is going to be longer as the nesting algorithms will run through an additional set of routines, compare with the original and then display the better of the two results. By running the **Extended** nesting, you will get either the SAME or BETTER nested results than if you were to run without marking the check box. But there is a trade-off, **Extended** nesting will take significantly longer time to run.

Explanation of the ***TaskEdit*** dialog box continues below:-

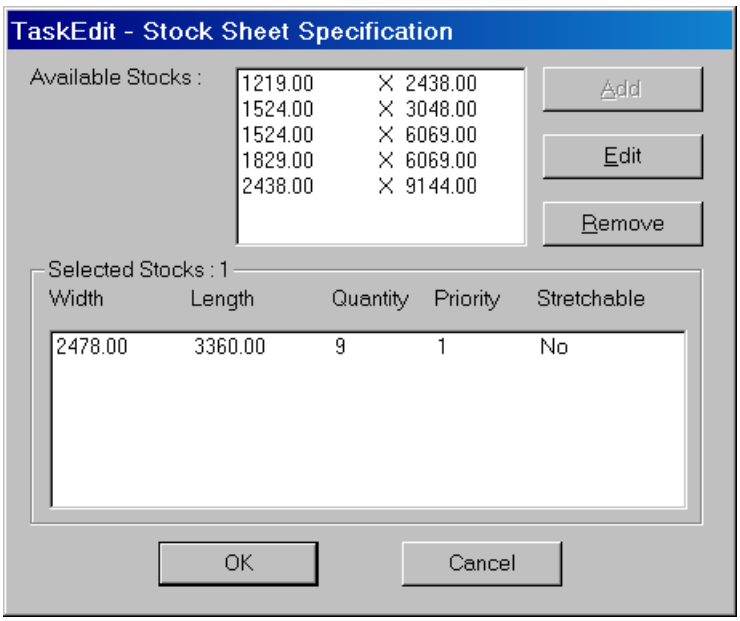
Cutting Gap	This is the cutting gap between nested parts to allow for the tool size.
Edge Allowance **-Regular Stock** **-Irregular Stock**	Sometimes, it is necessary to leave out an edge around the perimeter of the stock sheet. This is to cater for trimming or clamping purposes. For regular or rectangular stock, the edge allowance of the 4 sides of the stock can be defined. For irregular stock, a common edge allowance can also be defined.
Left	"Left" is the edge allowance in the x direction on the left side of stock sheet.
Bottom	"Bottom" is the edge allowance in the y direction from the bottom of the stock sheet.
Right	"Right" is the edge allowance in the x direction on the right side of the stock sheet.
Top	"Top" is the edge allowance in the y direction from the top of the stock sheet.
Irregular Stock	The edge allowance around the Irregular stock.
No. of Distinct Stocks	Number of different sizes of stock sheets. A maximum of 500 distinct stock sizes is available for the current version.
No. of Distinct Irregular Stocks	Number of different sizes of irregular stock sheets. A maximum of 500 distinct stock sizes is available for the current version
No. of Distinct Parts	Number of distinct parts to be nested. A maximum of 1000 distinct parts is available for the current version.



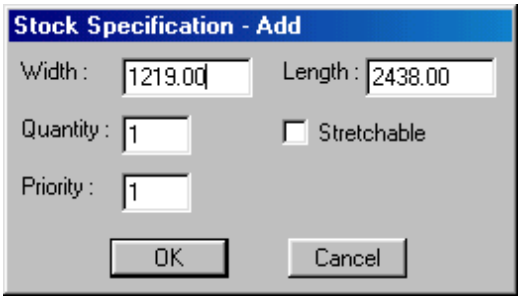


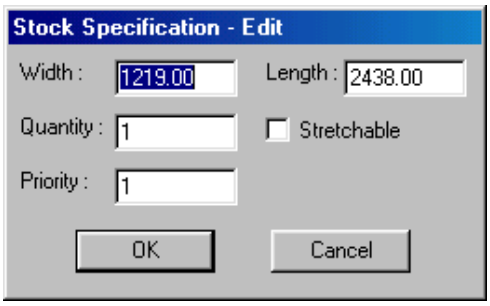
Define R-Stocks

When you click the Define R-Stocks button, the following dialog box appears.



You can add, change or delete the stock specification by clicking the Add , Edit or Remove button respectively. Highlight one of the stock size in the "Available Stock" list box and then pick the Edit button or click the Add button. The following pop-up windows will appear.

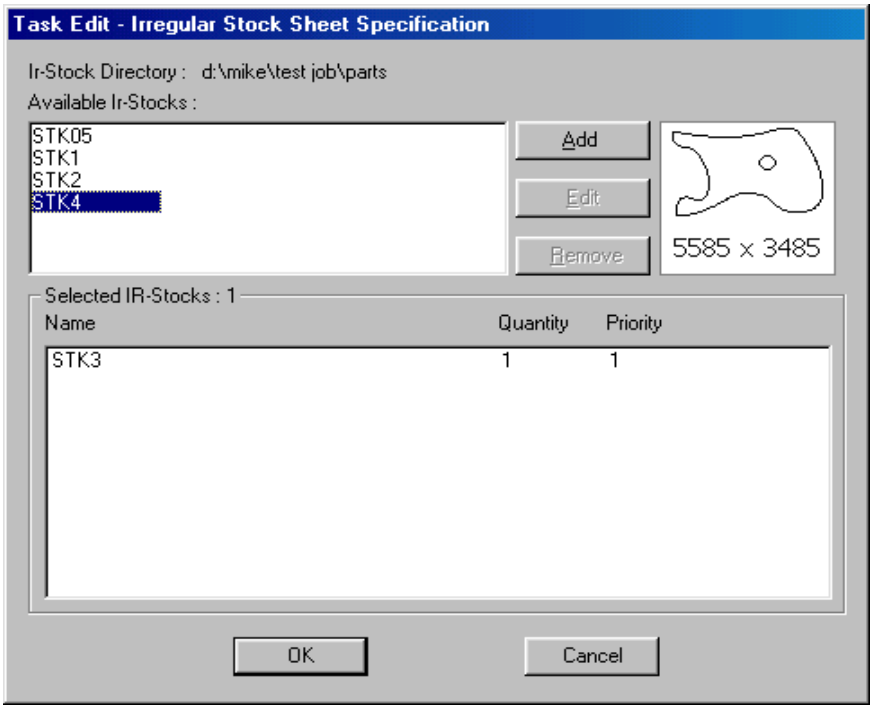




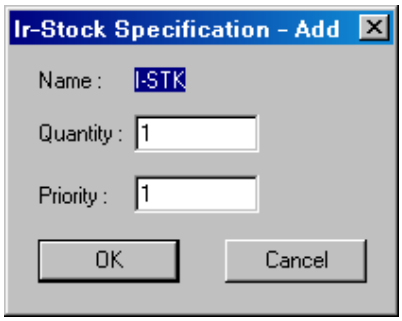
Width **Length**	The width and length dimensions of the stock sheet. For 'Imperial Units' users, you can either enter in feet and inches or purely in inches. In the latter case, the inches will automatically be converted into feet and inches if Architectural-Imperial or Engineering-Imperial units are chosen.
Quantity	Quantity of stock-sheets of that particular size to be used in the task. Maximum quantity allowed for each distinct stock is 9999.
Stretchable	For stock sheets in reels or rolls, the length of the stock sheet can be extended or stretched beyond the specified dimension to accommodate the nesting results. If 'Yes' is chosen, (mark the "Stretchable" checkbox), *Auto*NEST will have the liberty to increase the Length as much as it takes to pack-in all the parts optimally. Note this feature is currently only available for tasks, which nest only one part (Single Part Task).
Priority	The priority of using the stock-sheets when different stock sizes are available. You can define the order of priority in which *Auto*NEST should use the stock sheets. **1** has the highest priority. **99** has the lowest priority. If two or more stock sizes have the same priority number, the system will automatically decide based on the material utilization.

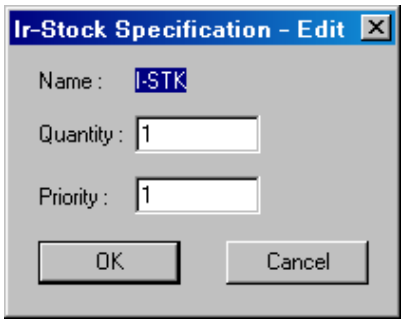
Define Ir-Stocks

By clicking the Define Ir-Stocks button, the dialog box below appears.



You can add, change or delete the irregular stock specification by clicking the Add, Edit or Remove button respectively. You can highlight more than 1 stock name and then pick the Edit button or click the Add button. The following pop-up window will appear.

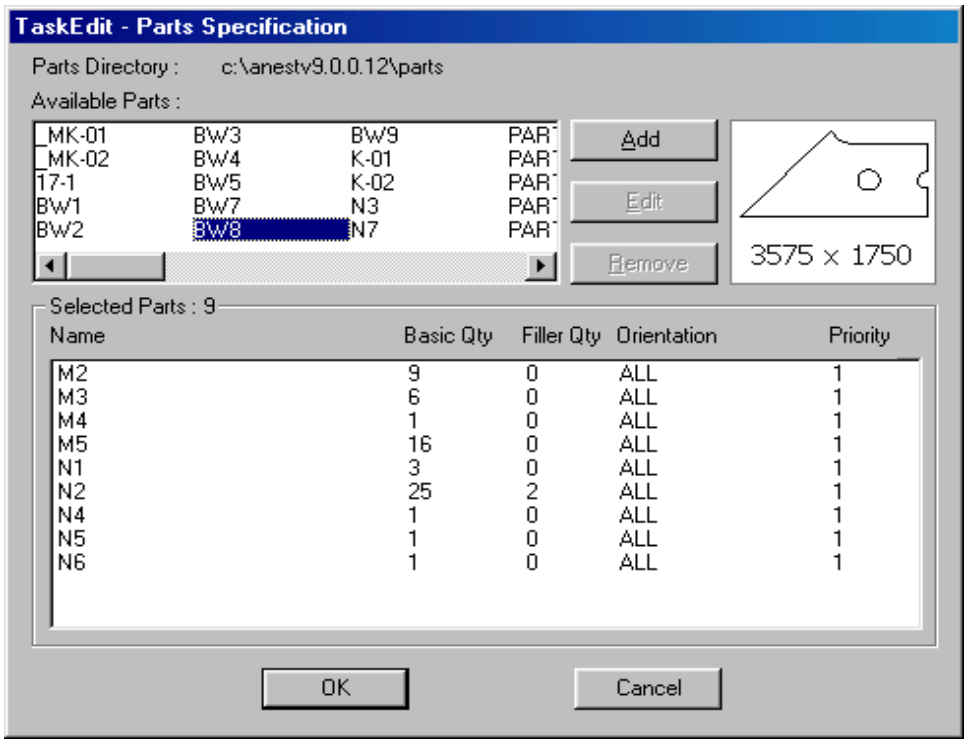




Name	Show the name of the Irregular stock (.stk). If a list of irregular stock is selected, "$$$$$$$" will appear.
Quantity	Quantity of that particular irregular stock to be used in the task. Maximum quantity allowed for each distinct stock is 9999.
Priority	The priority of using the stock-sheets when more than one is available. You can define the order of priority in which *Auto*NEST should use the Irregular stock. **1** has the highest priority. **99** has the lowest priority. If two or more stocks have the same priority number, the system will nest the smallest Irregular stock first.

Define Parts

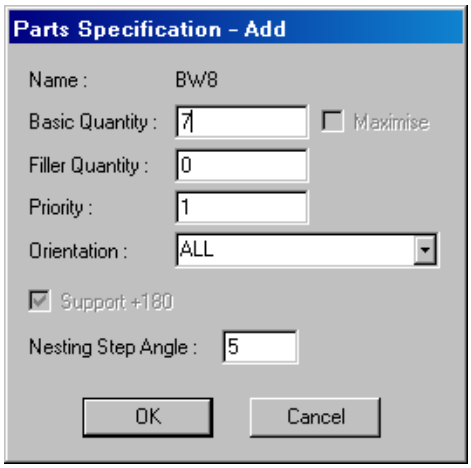
By clicking the Define Parts button, the dialog box below appears.

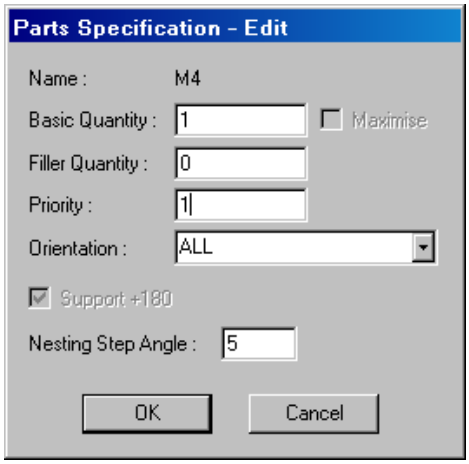


Whenever a part name from the listing of **Available Parts** is highlighted, a viewer will display the part profile with the overall dimension of the part profile. The overall length and breadth dimensions will be rounded off to the nearest integer value.

Available Parts

Display a list of parts that are available in the part directory. You can highlight a list of parts and press Add button to add them to the Selected Parts list box. The following pop-up window appears when the Add button is pressed.





Both the **Add** and **Edit** pop-up windows allow editing. The Delete button will remove the part specification from the "selected parts" list box. The Add button will place it back to the "**Selected Parts**" list.

If you select the Edit button the above pop-up windows will appear.

Explanation of the above dialog boxes is given below:

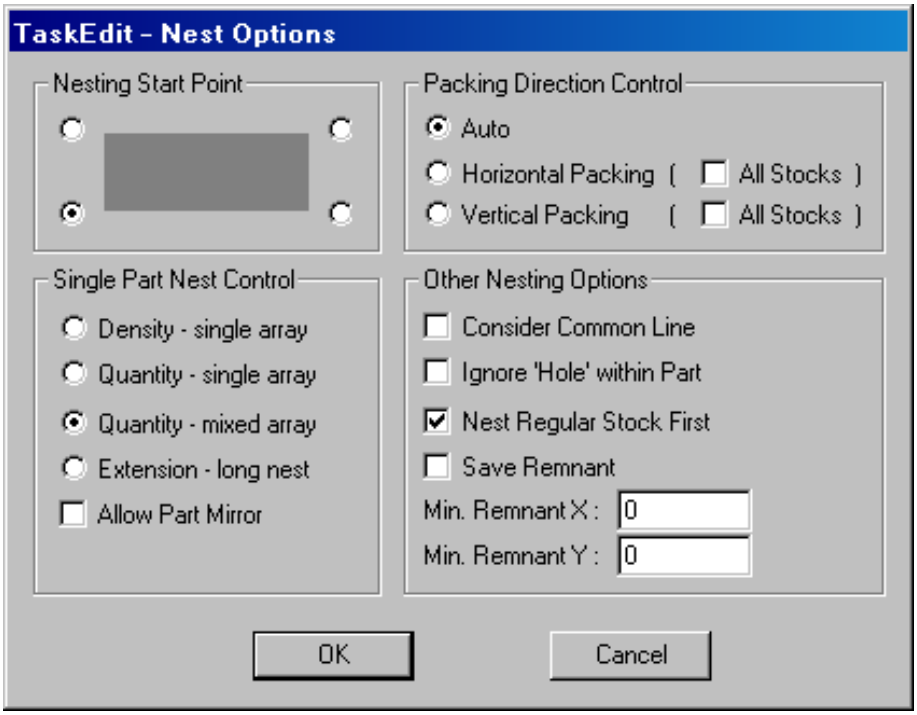
Name	Show the name of the part that you have selected. If more than 1 parts are selected, '$$$$$$$$' will appear.
Basic Quantity	Number of that particular part required to be nested. Each part has a maximum quantity of 9999.
Filler Quantity	Number of that particular filler part to be nested. Each filler part has a maximum quantity of 9999. The AutoNEST will decide how many filler parts to be utilized in order to fill the stock up to an acceptable layout. It will not exceed the amount that the user had specified.
Maximize	For single part tasks, check the '**Maximize**' check box to specify the program to fill up the whole stock sheet with the necessary quantity of parts. Not valid for stretchable stocks.

Maximize	For single part tasks, check the '**Maximize**' check box to specify the program to fill up the whole stock sheet with the necessary quantity of parts. Not valid for stretchable stocks.
Priority	The priority of each and every part to be nested. **1** has the highest priority. **9999** has the lowest priority. AutoNEST will nest according to the priority settings i.e. parts of Priority 1 will be nested first, followed by Priority 2, then 3 and so on. If two or more parts have the same priority, AutoNEST will decide automatically which part is to be nested first.
Orientation	To allow for orientation constraints of the part during nesting. **0** -- No rotation allowed. **0 90** -- 0° and 90° orientations allowed. **0 180** -- 0° and 180° orientations allowed. **0 90 180** -- 0°, 90° and 180° orientations allowed. **ALL** -- All orientations allowed. No orientation constraints. Beside the above allowable orientations, you can enter any allowable angles of orientation
Support + 180	Mark the check box, to allow the part to orientate to the specified allowable angles and their +180° combinations. This option is not applicable when **Orientation=ALL**.
Nesting Step angle	To allow a part to orientate step-incrementally in the defined angle during nesting.

Nest Options

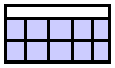
Click the

command button to bring up the dialog box as shown.



This dialog box allows the user to define some control parameters for specific nesting output requirements.

The default settings are recommended for all users who do not require special nesting output conditions. The options available are explained as follows:

Nesting Start Point	4 nesting start points are available depending on the user's nested output requirements. Click one of the 4 corner points to set start point. Point chosen shall remain as default until it is changed.
Packing Direction Control	It is recommended for the packing direction to be set to '**Auto**'. However, if required either "Horizontal Packing" (pack along the x-axis) or "vertical packing (pack along the y-axis) can be selected.
Auto	AutoNEST will automatically decide the best packing direction based on the material utilization of the nesting. This is the default setting.
Horizontal Packing 	When this radio button is marked, only the last nested layout will be packed horizontally. However, when the "**All Stocks**" check box is marked, then all the nested layouts will be packed horizontally. See illustration on Page 4-40.

Vertical Packing	When this radio button is marked, only the last nested layout will be packed vertically. However, when the "**All Stocks**" check box is marked, then all the nested layouts will be packed vertically. See illustration on Page 4-40.
Other Nesting Options	The nesting options are:- • **Consider Common Line** • **Ignore 'Hole' within Part** • **Nest Regular Stock First**. • **Save Remnant** • **Min Remnant X / Y** They are explained as follows:-
Consider Common Line	Select this option if you want *Auto*NEST to consider packing of the parts along their common edges. This feature will save cutting time. However, *Auto*NEST will consider the common line packing together with the quality of the nesting.
Ignore 'Hole' within Part	Mark this check box to ignore all "holes" and cut outs within Parts during nesting. So that no parts will be packed into these "holes" or cut-outs.
Nest Regular Stock First	Mark this check box to nest regular stocks first. The default is to nest irregular stocks first.
Save Remnant	Mark this check box to save the remnants of the stocks automatically after every nest, as long as they are of the minimum X and Y size or more. (The original profile of the rectangular stocks will also be saved with the remnants) By default these remnants will be saved into the Part/ Irregular Stock directory. The names of the remnant stocks will be *Taskname_$REM1-1.stk*, *Taskname_$REM2-1.stk*, *Taskname_$REM2-2.stk* and so on. The naming convention is as follows :- *_$REM(LAYOUT_NO)-(NO) In addition, a Task will automatically be created bearing the Taskname_$REM.job. To view "Remnant" tasks click the Task Type radio button "**Remnant**" when selecting tasks in the **TaskEdit** dialog box.

Min. Remnant X Min. Remnant Y	The minimum remnant dimensions in length (x-dimension) and breadth (y-dimension). The default dimension is 600 x 600. The maximum value is limited to 6 digit (Eg. 999999)
Single Part Nest Control	This portion of the dialog box will be grey-out unless the Task consists of only ONE Part. For Single-part nesting, there are 5 options or controls. They are:- • **Density - Single array** • **Quantity - Single array** • **Quantity - Mixed array** • **Extension - Long Nest** ☐ **Allow Part Mirror** The illustrations on Pages 4-41 to 4-42 will give you a better understanding of these control settings.
Density-Single array	The most-dense packing pattern in a single array.
Quantity- Single array	The highest quantity of parts nested in a single array.
Quantity-Mixed array	This is the default option. Maximum quantity of parts nested onto the stock sheet.
Extension-Long Nest	This nesting option will take the longest time compared with the other three. It will go through more iteration to produce either the same or better results than Quantity-Mixed array.
Allow Part Mirror	If this option is checked, the nesting will consider the part (single) and its mirrored image during the nesting. "Allow Part Mirror" can be used in conjunction with any of the other 4 options

TaskEdit - Users can enter multiple tasks but

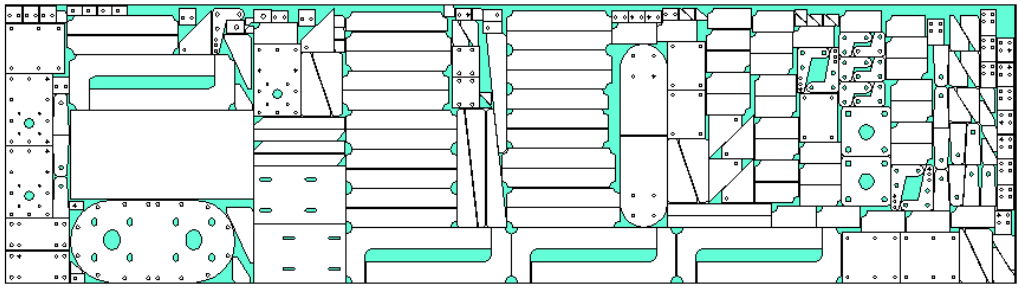
each task at a time. To exit, click

button. For every task created, there is a corresponding file with extension *.***JOB** being written on the default Task directory set at the ***Sysdata***. For example:

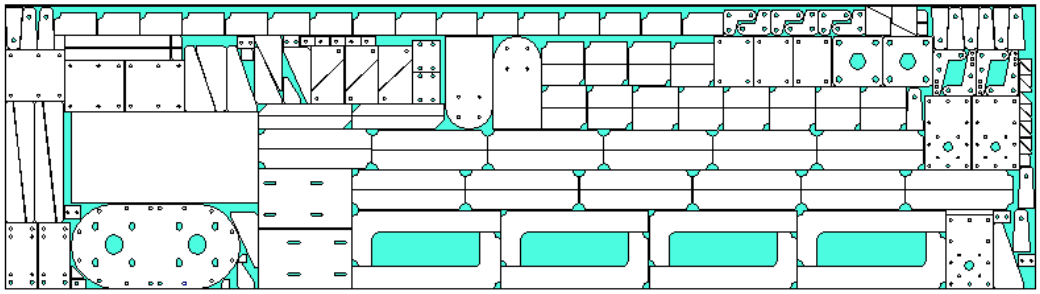
Task Name : *SAMPLE*
Filename : *SAMPLE.JOB*

Illustrations for Packing Direction Control

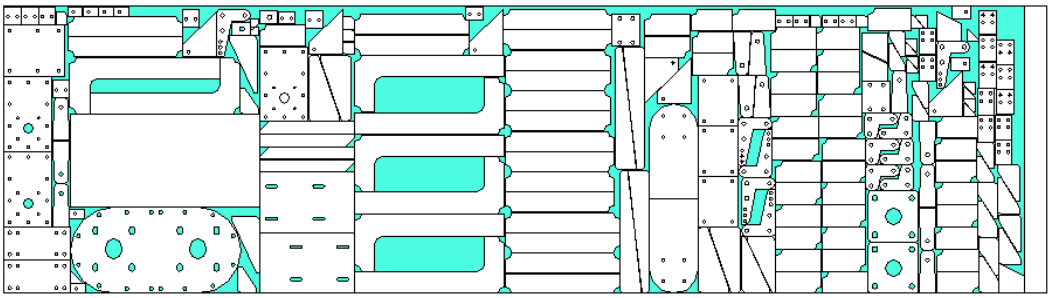
AUTO Packing



Horizontal Packing

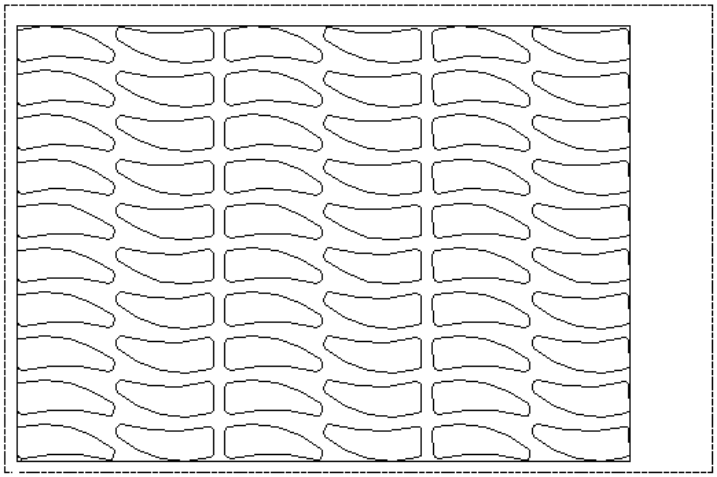


Vertical Packing

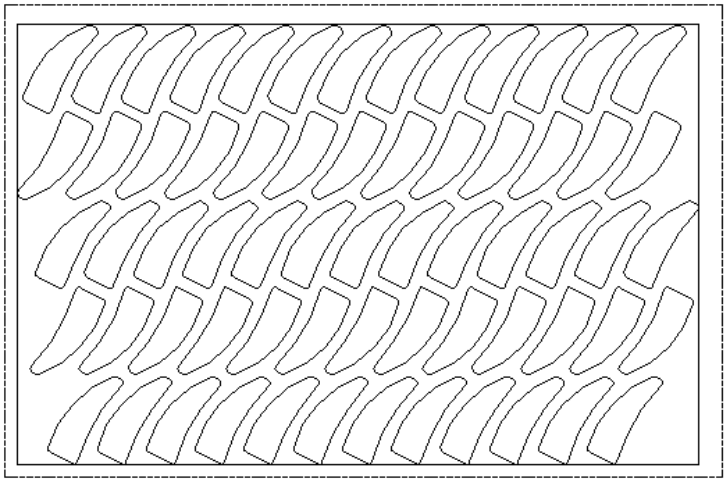


Illustrations for Single Part Nest Control

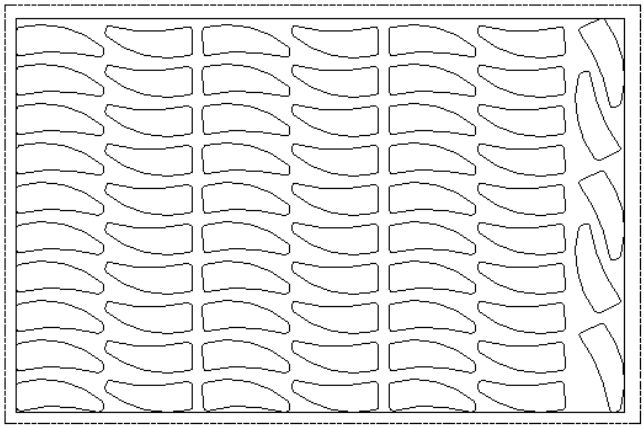
Density - Single Array



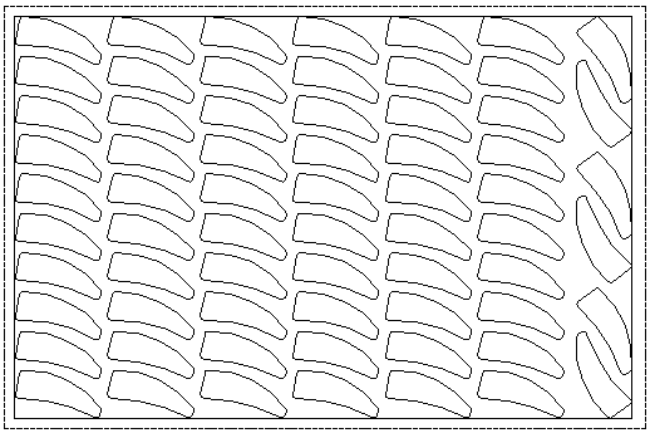
Quantity - Single Array



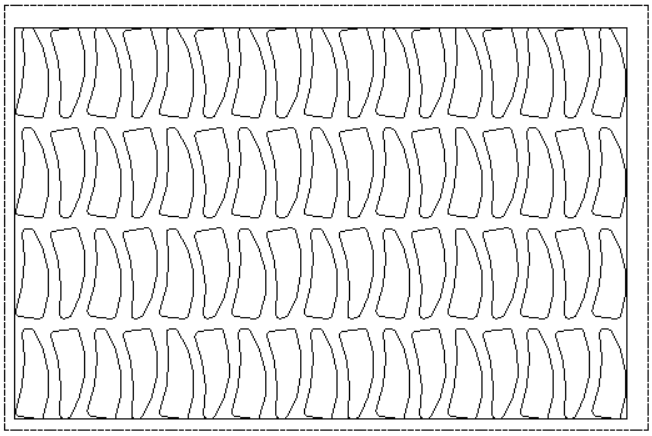
Quantity - Mixed Array



Extension- Long Nest



Allow Part Mirror (coupled with the Quantity-Mixed Array option)



4.6 Nesting

Introduction

The core nesting engine of *Auto*NEST is called **NestPRO**. The basic technology of **NestPRO** lies in its powerful nesting engine. **NestPRO** features an intelligence processor that auto-adapts to different nesting conditions such as stocks and parts of different size and quantity. **NestPRO** generates nested layouts that reduces material wastage and maximizes utilization.

There are two commands related to ***Nesting*** within the AutoCAD environment. Both commands generate nested layouts from tasks created by ***TaskEdit***. The first for nesting one task at a time, and the second for batch nesting of multiple tasks.

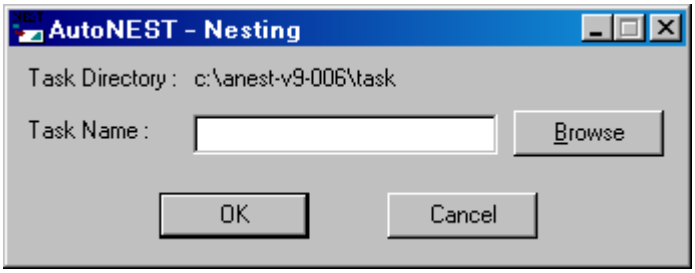
	Nesting (Single Task) To nest a single task at a time, and output immediately onto the current AutoCAD drawing session.
	BatchNesting To nest a selection of tasks sequentially. Output files are created for each nested task for viewing at a later stage. Use the ***ViewNEST*** command to view the nested layouts.

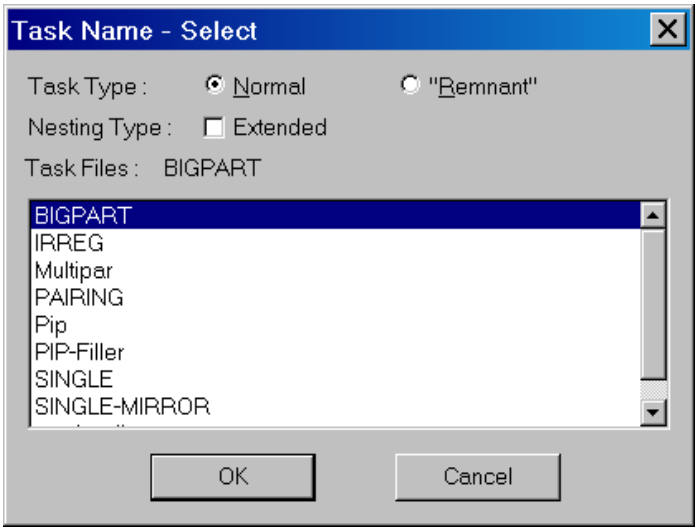
4.6.1 **Nesting** (Single Task)

Select the ***Nesting*** command from the icon or pulldown menu. The following will appear at the AutoCAD command prompt:

Insertion Pt <RETURN for (0,0)>:

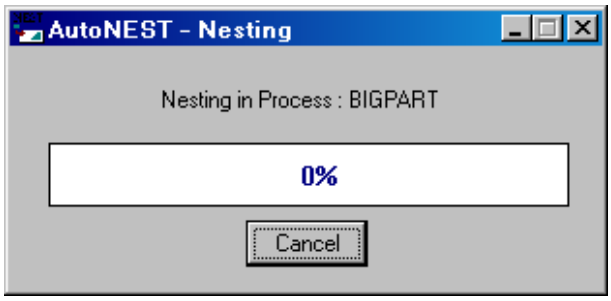
Select a point (lower-left corner) where the nested layout will be placed.
Subsequently, a dialog box as follows will appear.



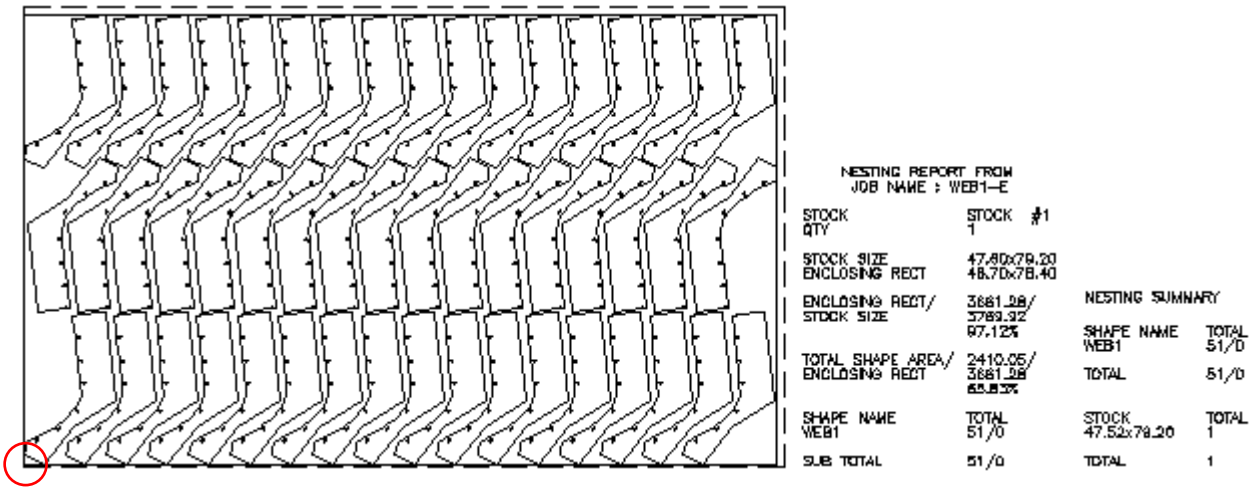
Task Directory	Display the default task directory set at ***Sysdata***.
Task Name	Enter the task name to be nested or click the Browse button to display a list of tasks available in the task directory for selection as follows: 

Task Type	Referring to the pop-up windows above, there are 2 selections :- • Normal • "Remnant" "Normal" tasks refer to all task files (*.job) created by the user. "Remnant" tasks refer to tasks files (*.job) with the reserved suffix, "_$REM" . For example : XYZ_$REM.job. These tasks are automatically created if the **"Save Remnant"** check box in the **Nesting Options** of ***TaskEdit*** is marked. For more details, refer to Chapter 4.5 ***TaskEdit***.
Nesting Type	By default, the **Extended** check box is un-marked which means that the nesting will run its usual course. If the **Extended** check-box is marked, then the nesting time is going to be longer as the nesting algorithms will run through an additional set of routines, compare with the original and then display the better of the two results. By running the **Extended** nesting, you will get either the SAME or BETTER nested results than if you were to run without marking the check box. But there is a trade-off, **Extended** nesting will take significantly longer time to run.

Once the Task name has been confirmed, click the ***OK*** button to start the nesting. The following dialog box appears – indicating that the nesting is in progress.



The nested layout will be displayed onto the current drawing, at the location indicated by the Insertion point.



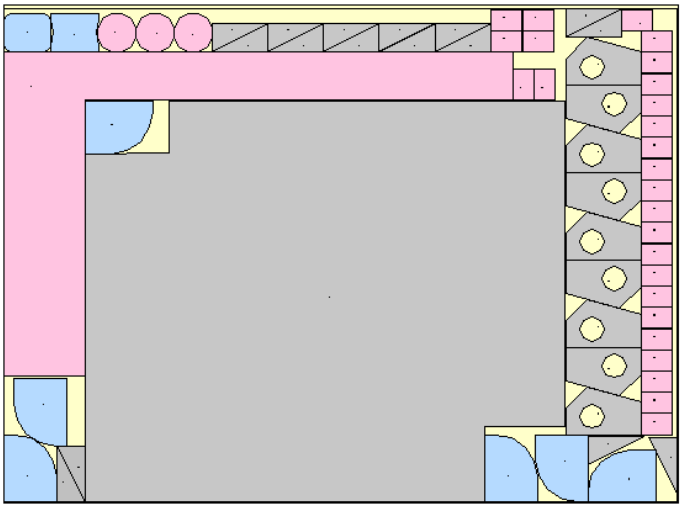
Internally, once a task has been successfully nested, output files will be created. These files have the same name as the task but different file extensions as shown below.
Example : Task name is *SAMPLE*

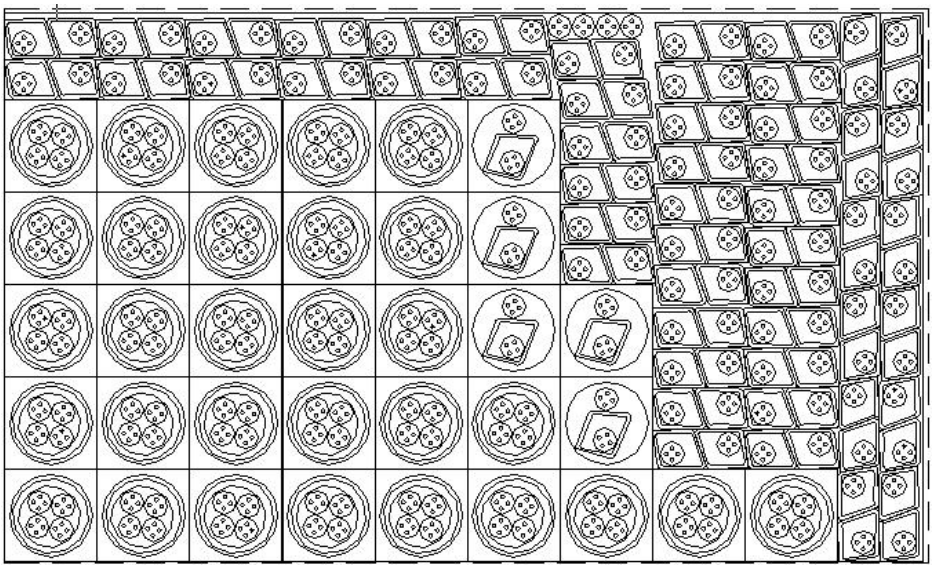
Output Files: *SAMPLE.SYM*
SAMPLE.SUM

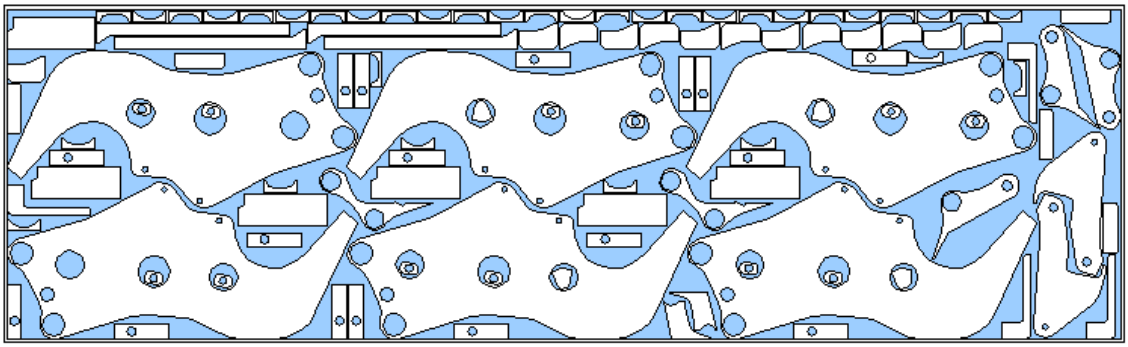
The ***.SYM*** file contains the results of the nesting in terms of each part and its location in the layout. The format of the files is described in detail in Chapter 6.

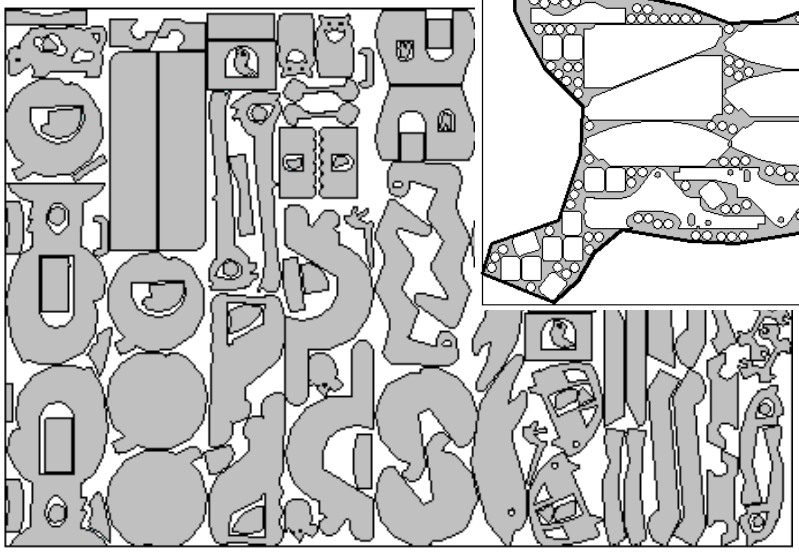
The ***.SUM*** file contains the nesting summary report in TEXT format.

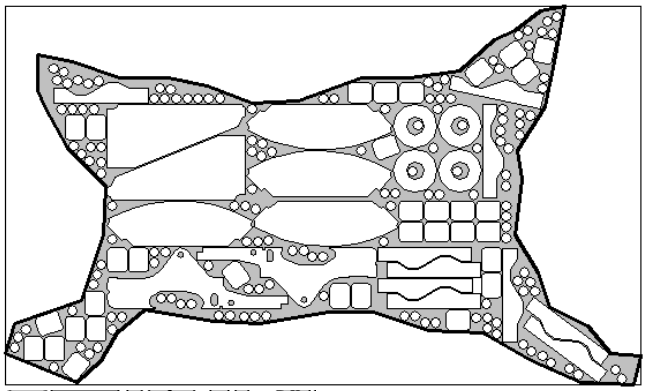
Examples of Nested Layouts





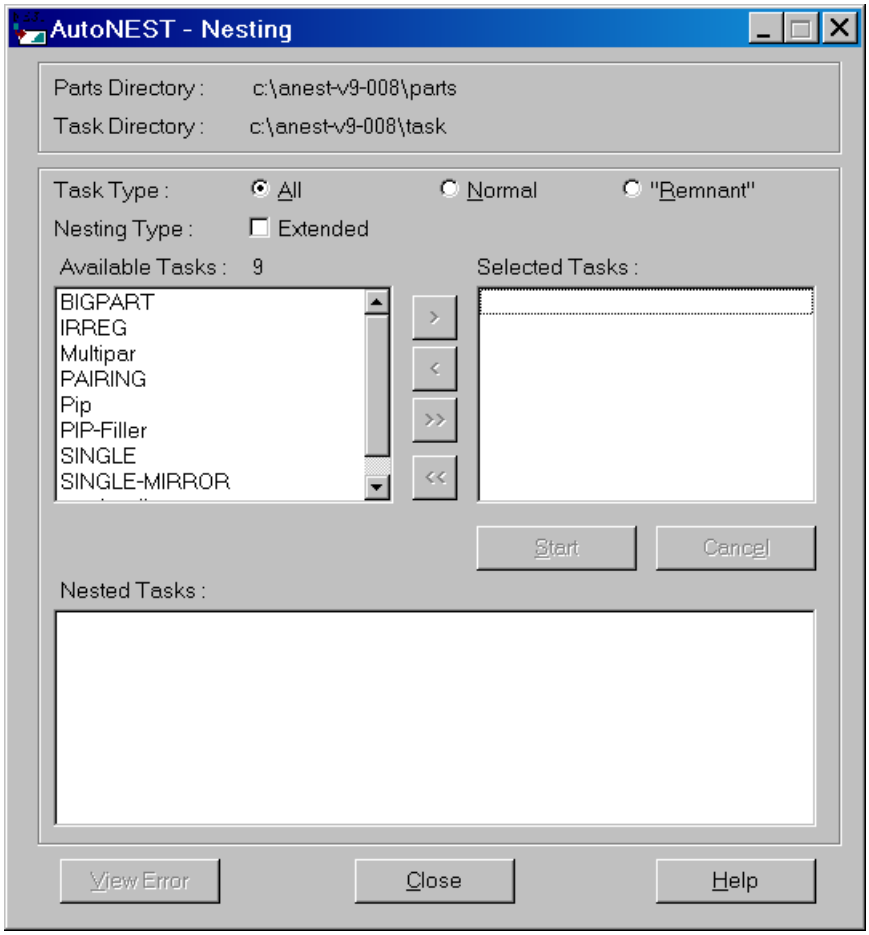






4.6.2 BatchNesting

At times you may like to nest a series of tasks overnight or during a break. This facility is provided via the ***BatchNesting*** command. But to view the already nested layouts, pick the ***ViewNEST*** command. Select the ***BatchNesting*** command from the icon or pulldown menu. The following dialog box will appear :



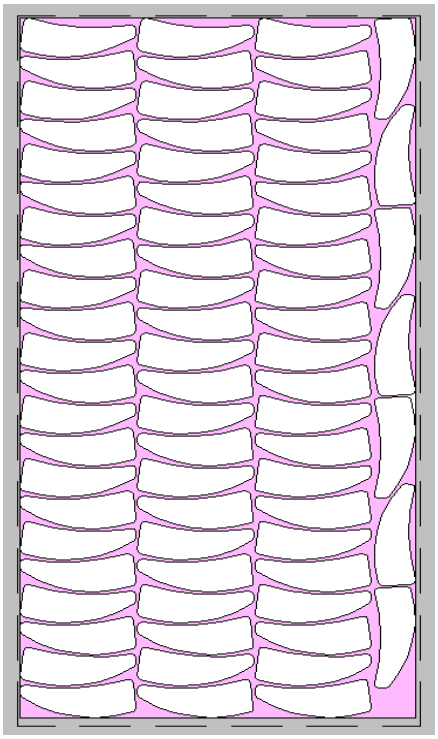
Each dialog box input option is described in the following:

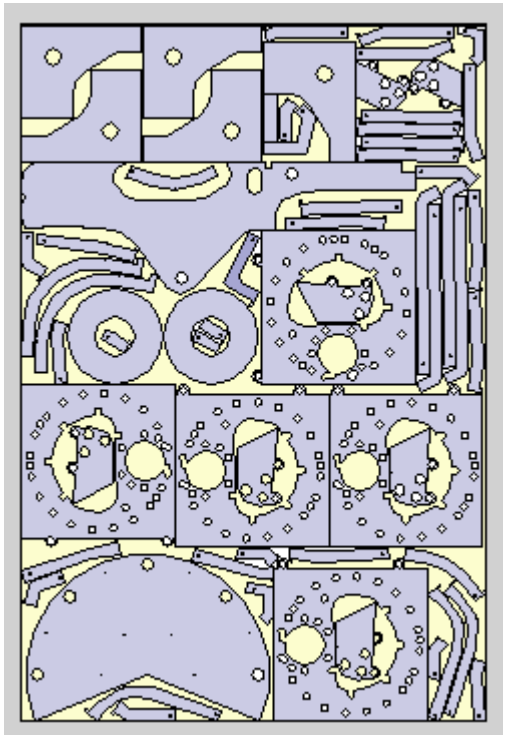
Parts Directory	Display the default part directory as set in the ***Sysdata***.
Task Directory	Display the default task directory as set in the ***Sysdata***.

Task Type	There are 3 radio buttons:- • All • Normal • "Remnant" "All" refers to all task files (*.job) residing on the current Task directory. "Normal" tasks refer to all task files (*.job) created by the user. "Remnant" tasks refer to tasks files (*.job) with the reserved suffix, "_$REM" . For example : XYZ_$REM.job. These tasks are automatically created if the **"Save Remnant"** check box in the **Nesting Options** of ***TaskEdit*** is marked. For more details, refer to Chapter 4.5 ***TaskEdit***.
Nesting Type	By default, the **Extended** check box is un-marked which means that the nesting will run its usual course. If the **Extended** check-box is marked, then the nesting time is going to be longer as the nesting algorithms will run through an additional set of routines, compare with the original and then display the better of the two results. By running the **Extended** nesting, you will get either the SAME or BETTER nested results than if you were to run without marking the check box. But there is a trade-off, **Extended** nesting will take significantly longer time to run.
Available Task	Display a list of tasks (***.JOB***) files found in the task directory. You can select one or more files to be nested by highlighting the filenames and then click the button. Click the button to select ALL the files.
Selected Tasks	Display a list of task files selected to be nested. Click the button to un-select the file(s) or click to un-select ALL the files in the list box. You can click the button to start the nesting process.

Nested Tasks	Display a list of successfully nested task files. Click the View Error button to see if there is any error message. Internally, once a task has been successfully nested, output files will be created. These files have the same name as the task but different file extensions as shown below. Example : Task name is *SAMPLE* Output Files: *SAMPLE.SYM* *SAMPLE.SUM* The ***.SYM*** file contains the results of the nesting in terms of each part and its location in the layout. The format of the files is described in detail in Chapter 6. The ***.SUM*** file contains the nesting summary report in TEXT format.

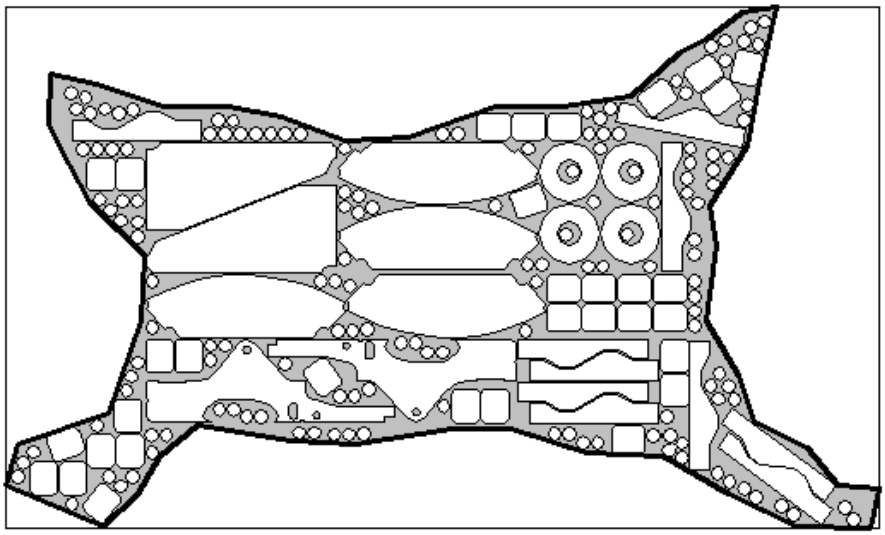
Samples of Nested Layouts





4.7 ViewNEST

The ***ViewNEST*** command is used to output nested task layout(s) (*.sym) onto the current AutoCAD session as a drawing. This command is especially useful for viewing of already nested layouts (e.g. ***BatchNesting***), viewing of updated nested layouts when there is change in the report text size or output file format type (as specified in ***Sysdata***) - without having to re-nest the task again.



NESTING REPORT OF
TASK NAME : TEST2

IR_STOCK	IR_STOCK #1
IR_STOCK NAME	Irstk8
QTY	1
IR_STOCK SIZE	5957.28x3551.84
IR_STOCK AREA	10559378.93
TOTAL PART AREA/ IR_STOCK AREA	7684850.76/ 10559378.93 72.78%
TOTAL PART PERIMETER	125815.12

PART NAME	TOTAL
10	10/10
11	4/4
12	2/2
20	150/0
6	4/4
7	2/2
N4	33/20
SUB TOTAL	205/42

NESTING SUMMARY

PART NAME	BASIC QTY	FILLER QTY
10	10/10	-
11	4/4	-
12	2/2	-
20	0/0	150/300
6	4/4	-
7	2/2	-
N4	20/20	13/30

TOTAL PARTS NESTED	205/372

STOCK	TOTAL
Irstk8	1
TOTAL	1

Nesting Summary Report

A nesting summary report will be created for each nested task at two places.

a) Next to the nested layout (right-hand side)
b) Text file in a ***. SUM*** file

You can set the TEXTSIZE of this nesting report on the drawing through the ***Sysdata***. In the same command, you can also choose NOT to display it with the nested layout. As for the layer and color of the nesting summary report, you can define them in "Layer / Color Setting" of ***Sysdata.***

The following information will be presented in the Nesting report:-

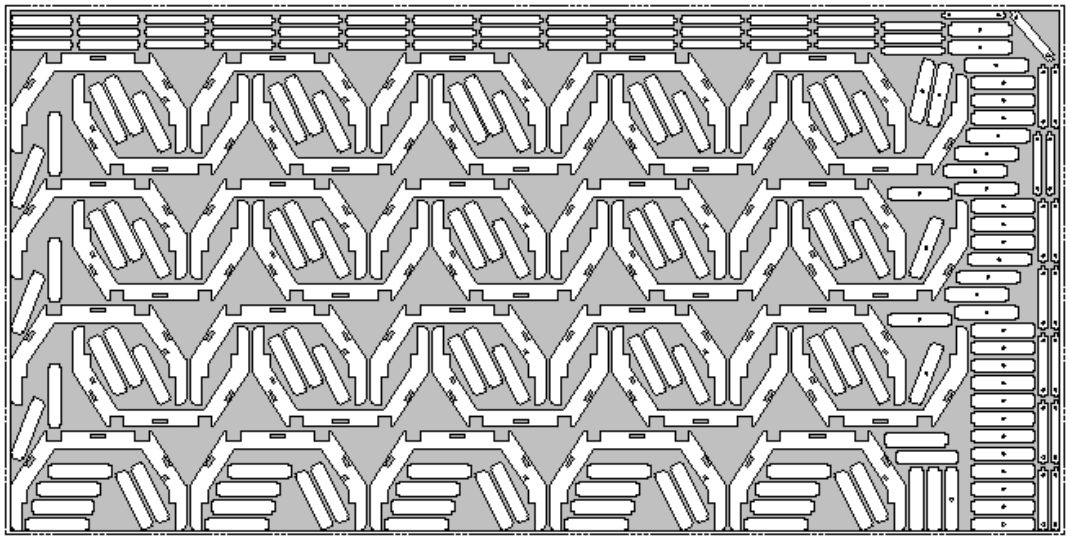
i) Name and quantity of parts nested / unnested.
ii) Total area and perimeter of parts nested
iii) $\frac{\text{Area of smallest enclosing rectangle}}{\text{Area of stock sheet}} \times 100\%$
iv) $\frac{\text{Sum of area of all parts nested}}{\text{Area of smallest enclosing rectangle}} \times 100\%$

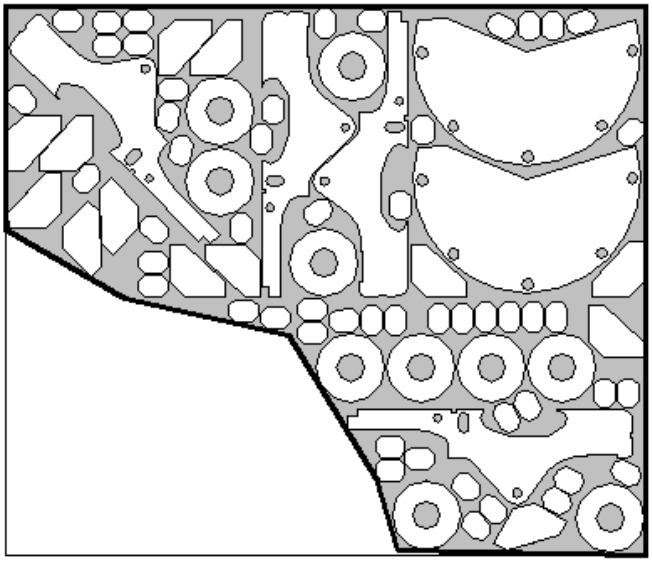
Sample Nesting Summary Report

NESTING REPORT OF TASK NAME: PIP

STOCK	STOCK #1			
QTY	1			
STOCK SIZE	2423.20x6121.50			
ENCLOSING RECT	2291.70x5966.50			
ENCLOSING RECT	13673428.05/			
STOCK SIZE	14833373.94	NESTING SUMMARY		
	92.18%			
		PART NAME	BASIC QTY	FILLER QTY
TOTAL PART AREA/	9400020.32/			
ENCLOSING RECT	13673428.05	PART1	6/6	
	68.75%	PART2	12/12	
TOTAL PART		PART3	24/24	
PERIMETER	195202.62	PART4	18/18	0/ 50
		PART5	18/18	
PART NAME				
PART1	6/6	TOTAL PARTS		
PART2	12/12	NESTED	78/ 78	0/ 50
PART3	24/24			
PART4	18/18	STOCK	TOTAL	
PART5	18/18	2423.16x6121.50	1	
SUB TOTAL	78/ 78	TOTAL	1	

Typical nested layout:





4.8 UpdateNEST

Once the nested layout is presented onto the current AutoCAD drawing, you can have full access to all the AutoCAD commands. It is sometimes easier for the user to scrutinize an already nested layout and then decide how it can be further improved manually. In this case you can use your better judgement and experience to edit the layout through the ***MOVE, COPY,*** …etc. commands of AutoCAD.

However, after such a session, *Auto*NEST is not aware of these changes. Therefore, an ***UpdateNEST*** is necessary so that *Auto*NEST will do the following :-

- Update the drawings by re-displaying the nested layouts
- Update the nesting summary and re-calculate the utilization percentages
- Update the .SYM and .SUM files

Important :

This command works only if the nested layout is displayed in DWG format (see *Sysdata*'s "File Format")

The prompts below will appear :-

UpdateNEST: Task Name (? For list)<>:

The user is prompted the Task name that needs to be updated. < >will contain the name of the most recent entry of the Task name.

New Nested File Name<>:

You will be prompted the name of the new nested (.sym and .sum) file. You can enter a new name (e.g. SAMPLE-a) or if you enter the same name (e.g. SAMPLE), then the ***UpdateNEST*** will overwrite the existing nested files of the same name.

Select Objects:

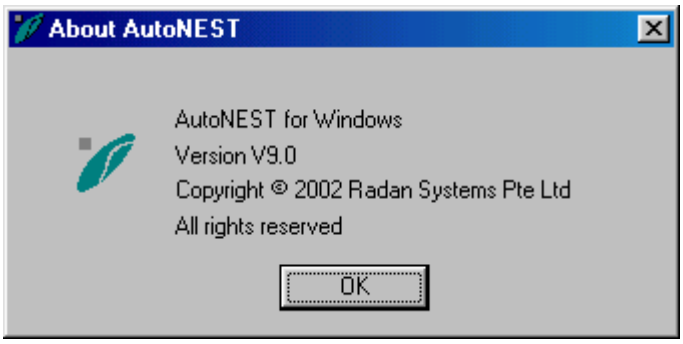
Here you are requested to enclose the layout(s). If the task consists of several nested layouts and only one of them has been edited, you still have to enclose/select all of them as long as they are of the same task.

Insertion Pt of New layout <RETURN for (0,0)>:

Indicate a point on the screen to indicate the lower-left corner of the nested layouts. The updated nested layouts and nested summary reports will be displayed with reference to the new insertion point.

4.9 About

This command will display a message box showing the product version number that you are currently using. The following dialog box will be displayed.



5.1 Getting Started

As mentioned in the earlier chapter, it is equally feasible to run *Auto*NEST independently in the Windows environment through the ***Nest Manager*** icon menu.

Running *Auto*NEST from ***Nest Manager*** will be advantageous in situation where another CAD software is used instead of AutoCAD. Lighter version of a CAD software such as AutoCAD LT may be used to create the parts and to view the nested layouts in DXF format.

The *Auto*NEST ***Nest Manager*** Icon Menu consists of seven icons. They are :-

	Sysdata To set environmental settings for running *Auto*NEST.
	DXF2PART (ConvertPart) To convert DXF files to Parts (.VEC). As well as from Part (.VEC) files back to DXF format.
	DXF2STK (ConvertIrStock) To convert DXF file format to irregular stock (.stk). As well as from irregular stock (.stk) files to DXF.format.
	TaskEdit To specify or edit a "task" by specifying a list of parts and stocks to be nested and the associated parameters of the nesting requirements.
	Nesting To nest any selected tasks. After successful nesting, the nested layouts are saved in DXF files.
	On-line Help To view online help file, click this icon.
	About To view the version number of the program, click this icon.

Each of these will be explained individually in the following pages. To activate any command, place the mouse cursor on the icon and click on it once.

5.1.1 *Auto*NEST Process

This section of the documentation makes reference to the use of *Auto*NEST in ***Nest Manager***. The ***Nest Manager*** works within the Windows operating system and is especially useful for users who are using CAD packages like AutoCAD LT that supports the DXF file format.

The step-by-step workflow of *Auto*NEST in the ***Nest Manager*** is as follows:

(1) Starting *Auto*NEST - *Nest Manager*

From the Windows **Start** button, select **Programs→ AutoNEST→ Nest Manager**. This will launch the AutoNEST Nest Manager icon menu on the Windows desktop. The following icon menu will be loaded, ready for use.

(2) Create Parts

Since AutoCAD is not in use. It is assumed that the users have Parts prepared in *.DXF* format. As required by the AutoNEST program, the user has to submit the geometry of the Parts in an established format of a *.VEC* file format. A command is available to convert . DXF files into . VEC files.

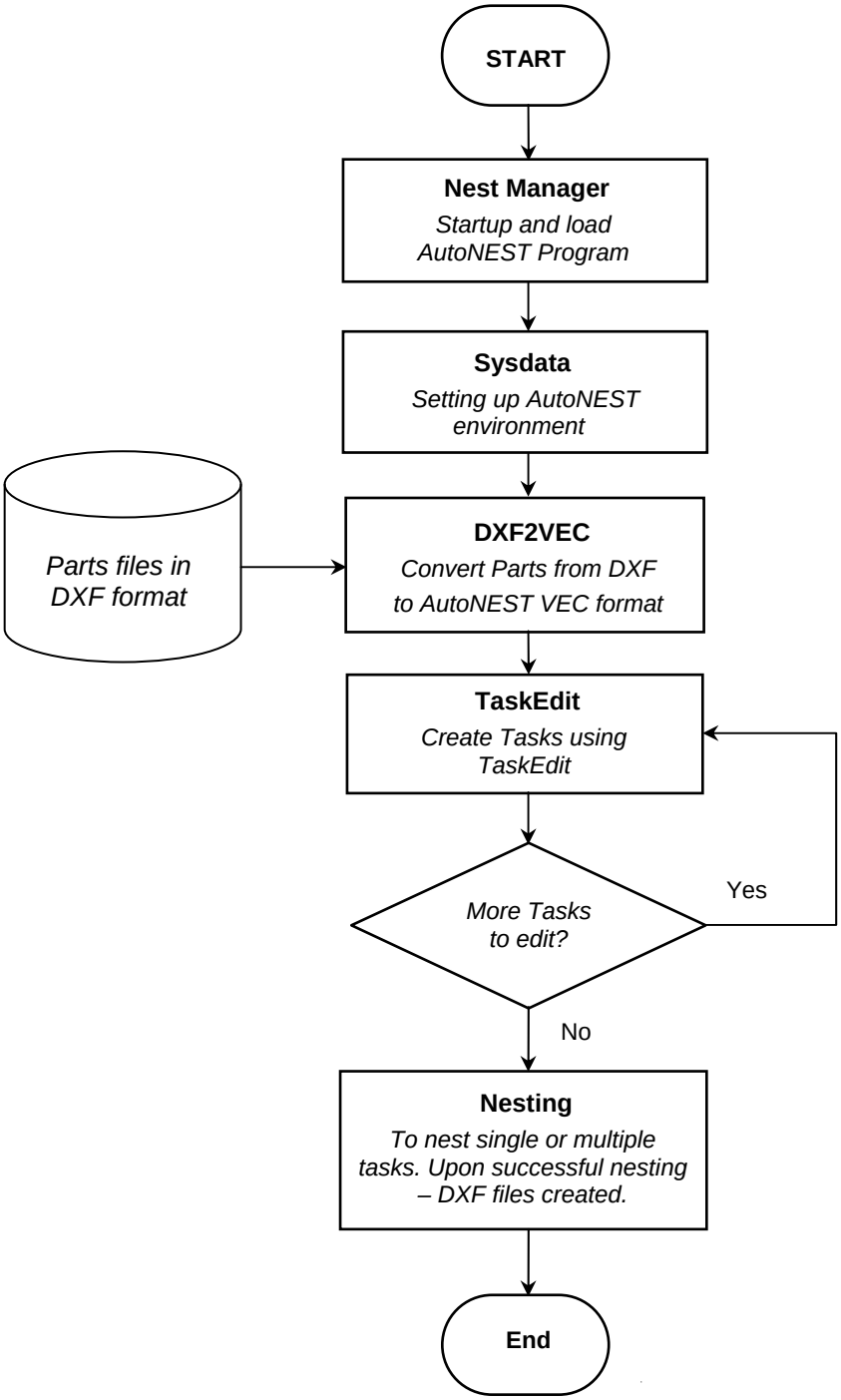
(3) Create Task

This is the task definition stage. Through Windows dialog boxes, the particulars of parts required to be nested onto specified stock sheets are specified. Other manufacturing details such as edge allowances, cutting gap and other nesting criteria are being specified here.

(4) Nesting

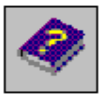
After having defined the nesting requirements in the previous stage, ***Nesting*** can now be invoked to compute the layout solutions. The resulting layouts are automatically converted into ***DXF*** format. To view the nested layouts, any CAD software that reads DXF files will do. In addition, two text files are also generated to reflect the nesting results.

Flow Chart of *Auto*NEST Process



5.1.2 *Auto*NEST Features

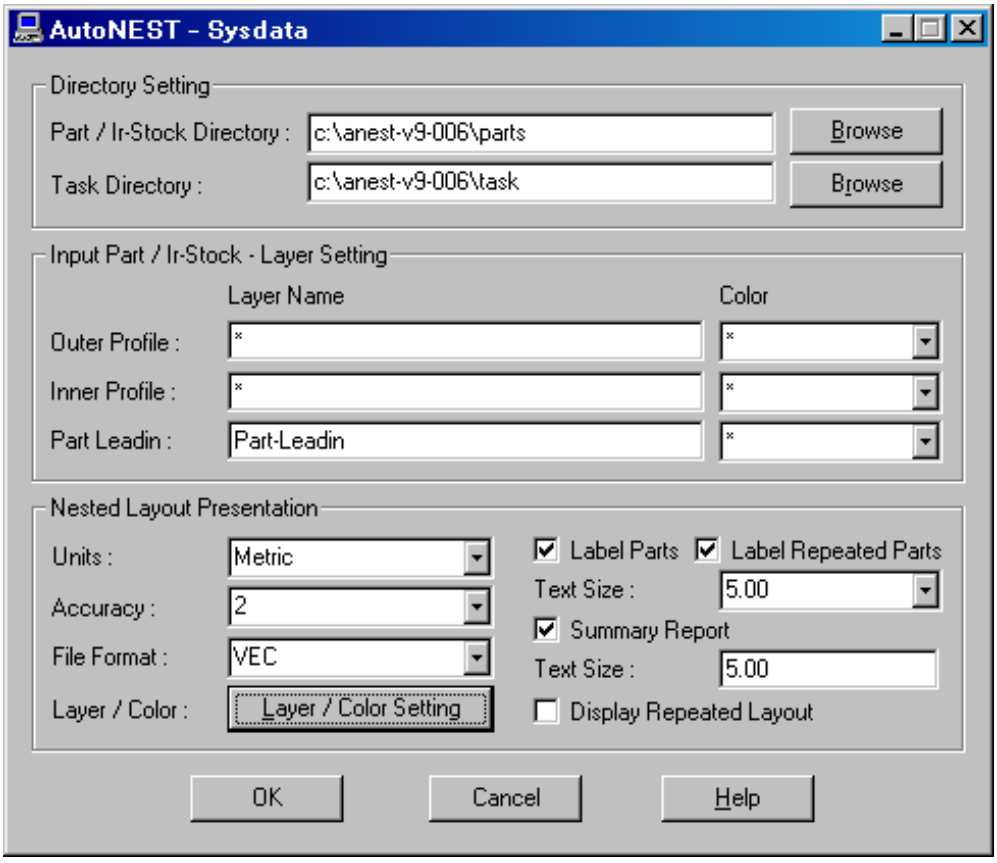
Below is a list of commands in the ***Nest Manager*** icon menu:

	Sysdata To set the environmental settings for the running of *Auto*NEST.
	DXF2PRT (ConvertPart) To convert DXF files to Parts (.VEC) and vice versa.
	DXF2STK (ConvertIrStock) To convert .DXF files to irregular stocks (.STK) and vice versa.
	TaskEdit To create or edit a task by specifying a list of stocks and a list of parts to be nested and the associated parameters of the nesting requirements
	BatchNesting To nest a group of selected tasks.
	***On-line Help*** To view on-line help file, click this icon.
	About To view the version number of the program, click this icon.

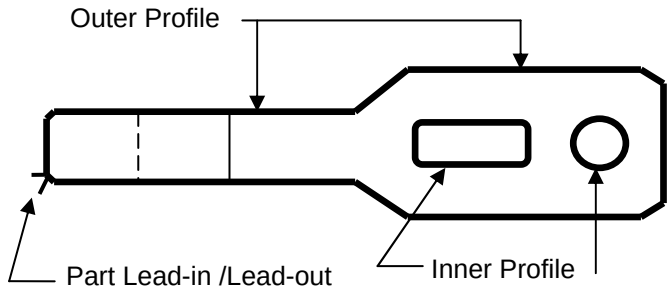
5.2 Sysdata

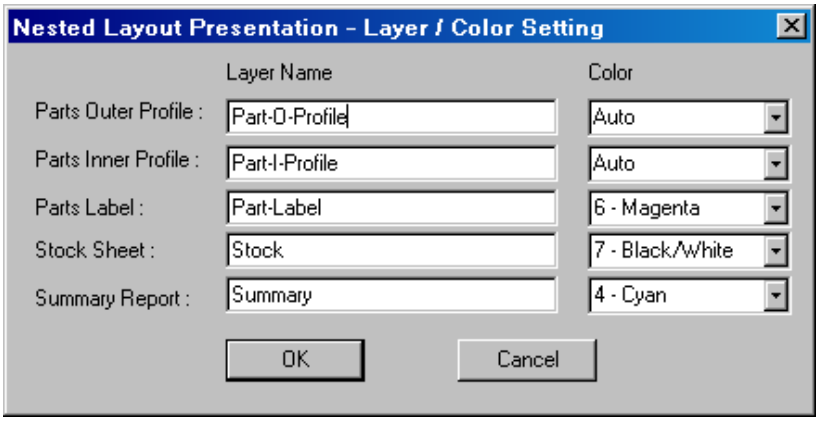
Sysdata is an important command to set the working environment for running *Auto*NEST. Before you begin to work with any of the other *Auto*NEST commands, it is recommended that the ***Sysdata*** command be activated to set the working environment.

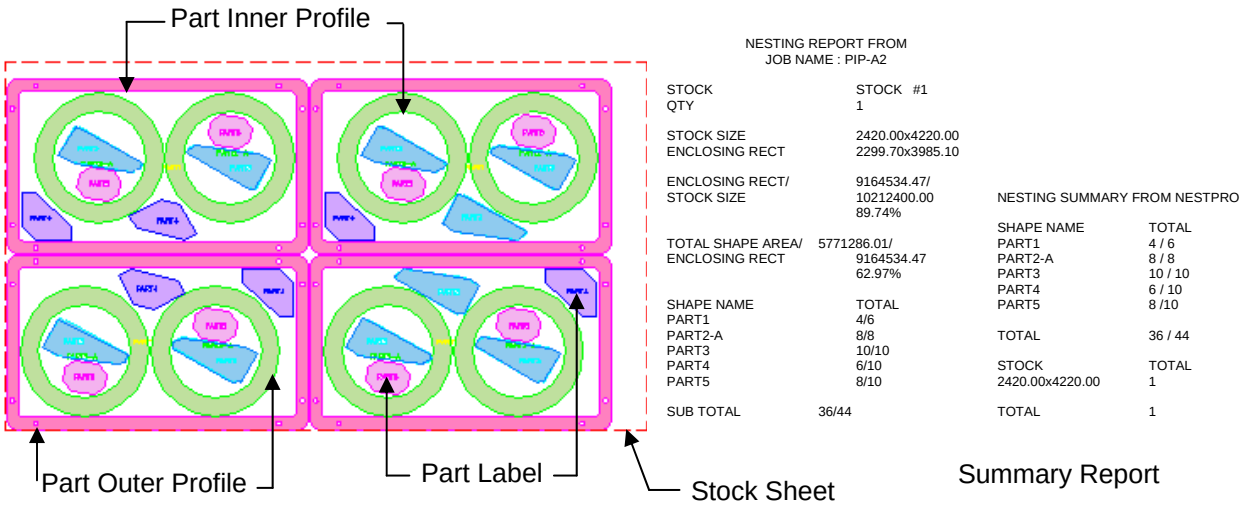
Select the ***Sysdata*** command and the following dialog box will be displayed.



Directory Setting	
Parts/ Ir-Stock Directory	To type in or click the Browse button to choose a directory where your parts and irregular stocks are to be located. (The directory or sub-directory must be created first)
Task Directory	To type in or click the Browse button to choose a directory where your tasks are to be located. (The directory or sub-directory must be created first)

Input Part /Ir-stock – Layer / Color Setting	
Outer Profile **Inner Profile** **Part Leadin**	These are the layer, color and part leadin/leadout "FILTER" settings that you can specify for both SavePART and DXF2VEC commands. These settings are especially helpful if the parts that you are saving or converting contain marking lines that touch or intersect the external /internal profiles of the shapes. By specifying the layer/color/part leadin filters, you will help SavePART and DXF2VEC commands to differentiate profiles that are crucial to nesting (outer and inner profiles of the part) against those that are not (markings or folding lines).  You can specify more than ONE colors in the "Color" field by entering for example "1,3" for colors 1 and 3 (separated by a comma)
Nested Layout - Presentation	
Units	The units setting of inputs and outputs. There are 4 choices to choose from :- Metric Architectural Imperial (1' 3-1/4") Decimal Imperial (15.25") Engineering Imperial (1' 3.25")
Accuracy	The number of decimal places or the number of digits to the right of the decimal point (0 to 4). If the units chosen above is Imperial, the denominator of the fractions or the accuracy will be expressed as follows:- 1 for full integers, no fractions 2 for 1/2" (half) 4 for 1/4" (quarter) 8 for 1/8" (eighth) 16 for 1/16' (sixteenth)

File Format	This option decides which part file format is to be used when generating graphical nested layout on screen. Three choices are available : ***DWG*** ***VEC*** ***DXF*** If you have chosen VEC format, please note the "Nested Layout – Layer Settings" (click the "Layer Setting" button) to define the layers and colors of the nested layout. If you have chosen DXF or DWG format, the nested layouts will display the layers/ colors of your parts as they were originally created.
Layer / Color **Parts Outer Profile** **Parts Inner Profile** **Parts Label** **Stock Sheet** **Summary Report**	The following dialog box will appear when you click this button -  User can define the layer and color for Part Labels, Stock Sheet and Summary reports. **PARTS** If the ***Sysdata*** "File Format" is VEC, the Parts displayed on the nested layout will follow the layer and color settings here. If DWG or DXF "File Format" are chosen, the Parts' layer and color settings will be exactly the same as they were originally saved. See diagram below for explanation of each of the names.



Label Parts **Text Size**	Mark this checkbox if you wish to display Part Label. And set the Text size of the Part label when displayed on screen. To change the layer/ color of the Part labels, click the "**Layer/ Color Setting**" button
Label Repeated Parts	Mark this checkbox if you wish to add a part Label on each and every part on the nested layout. When this checkbox is un-marked, when there are say 10 parts of the same name are nested, only ONE of the 10 parts will be labeled.
Summary Report **Text Size**	Mark this checkbox if you wish to display Summary Report. And set the Text size of the Report when displayed on screen. (The summary report is always displayed next to the lower right-hand corner of the nested layout) To change the layer/color of the Summary Report, click the "**Layer/ Color Setting**" button
Display Repeated Layout	Mark this checkbox if you wish to display the same nested layout repeatedly.

5.3 DXF2PART

Introduction

This section introduces a command related to **PARTS** within the *Auto*NEST Nest Manager environment. This utility will convert part files in .DXF format into *Auto*NEST Part files (.VEC format) and vice versa.

5.3.1

DXF2PART

DXF2PART will convert part files of ***.DXF*** format into the *Auto*NEST Part ***.VEC*** files.

The user has to submit the geometry of a part in an established format of a ***.VEC*** file. These *.VEC* files of the parts will be used by both the ***Nesting*** and ***BatchNesting*** commands.

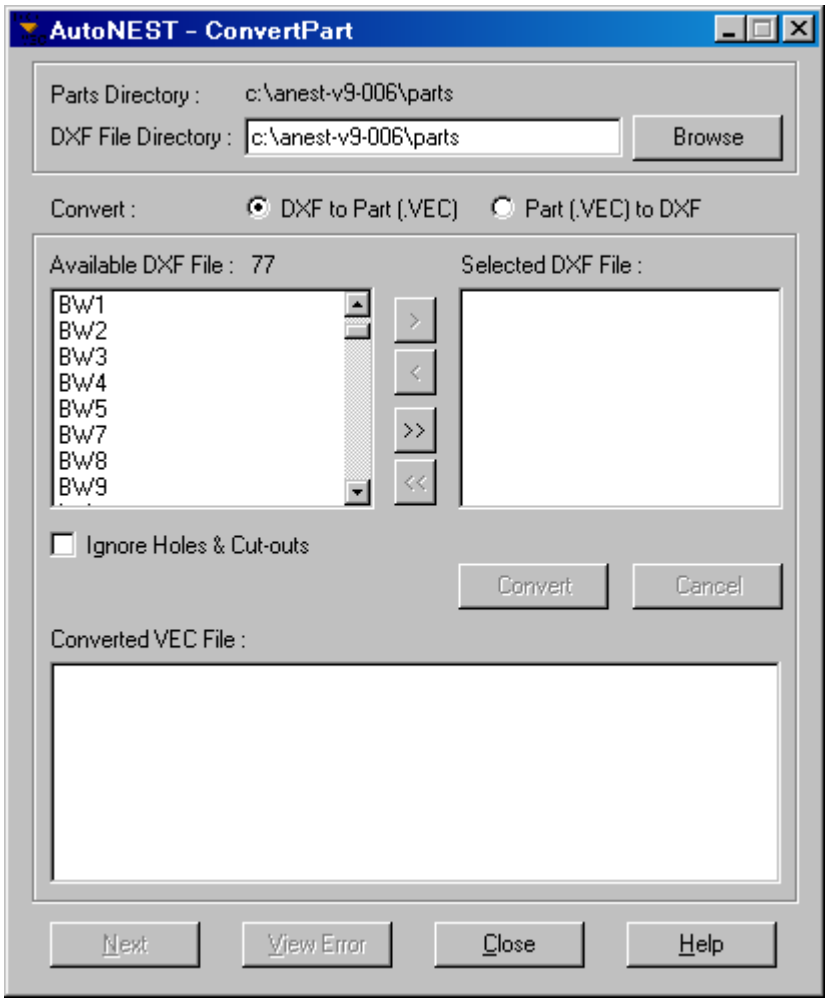
Likewise the user can convert ***.VEC*** format back into ***.DXF*** format

A ***.VEC*** file is an text file containing the x and y co-ordinates of vertices of the part profiles arranged in a counter-clockwise direction. If some segments of the profiles are arcs, bulge values will be attached to the starting vertices of arcs, or if the profile is a circle, center point and radius of the circle will be recorded. More detailed description is given in Chapter 6.1

Conditions for Part Profile

Acceptable	Unacceptable
• Lines, Arcs, Circle, Rectangle, Polyline, Polygon and Spline entities • External profile and internal holes profiles of a part must be closed. • Layer and Color of profile must be of as set in ***Sysdata***	• Block entity (acceptable if "**Explode**") • Pedit-Spline and Pedit-Fit (acceptable if "**Explode**") • Additional line/plines along the profile • Crossing over on each profile or between profiles • Part with more than 1500 vertices per profile

The dialog box is as below :-



Parts Directory	Display the default part directory set at ***Sysdata*.** In this case, it is also the target directory where all converted file will be saved.
DXF File directory	To type in or click the Browse button to select a directory where the source files are located.
Convert DXF to Part (.VEC)	Select this radio button to convert DXF files to Parts (.VEC).
Convert Part (.VEC) to DXF	Select this radio button to convert Part (.VEC) files to DXF format.

Available DXF/VEC File	Display a list of available files found in the Part Directory (This will depends on which conversion has been chosen). You can select one or more files to be converted by highlighting the filenames and then the > button or click this >> button to select all files.
Selected DXF/VEC File	Display a list of files selected for the conversion. You can select the filenames and click the < button to remove the files from the "Selected Parts" list (but the files still remained on the "Available Parts" list). Or click this << button to remove all files. Click the Convert button to initiate the process of conversion.
Ignore Holes and Cut-outs	If this check box is marked, holes and cut-outs will not be converted.
Converted VEC /DXF File	This will show files that have been converted successfully.
View Error	Click this icon to view error messages, if any. This is especially helpful as it will give a list of the filenames that cannot be converted for certain reasons.

5.4 DXF2STK

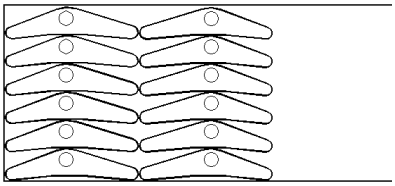
Introduction

This section introduces a command related to **Irregular Stocks** within the *Auto*NEST Nest Manager environment. This utility will convert irregular-shaped stocks that are in .DXF format into *Auto*NEST irregular stock files (.STK format) and vice versa.

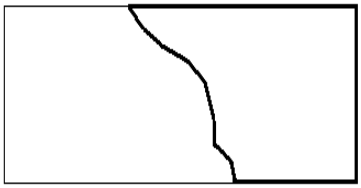
In *Auto*NEST, Irregular Stock is a generic name used to describe the following :-

1. Irregular-shaped sheet for nesting
2. Layout with pre-nested parts
3. Remnant sheet /stock

Examples of Irregular-shaped sheet / stock



Example of Layout with pre-nested parts



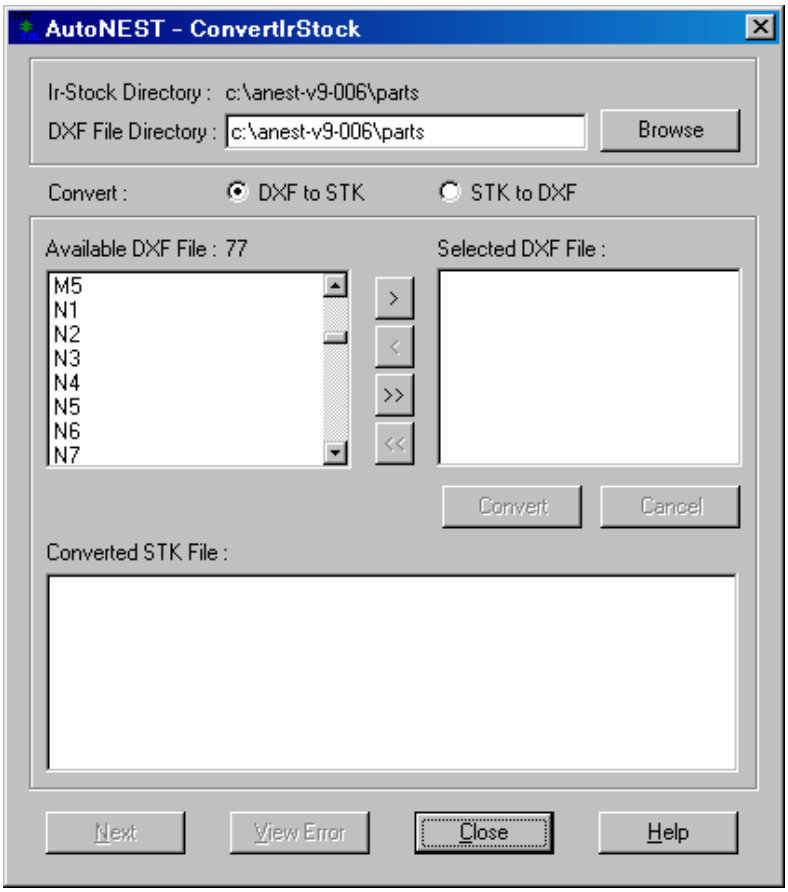
Example of Remnant sheet / stock

5.4.1 DXF2STK

ConvertIrStk is a function that allows the user to convert the irregular stock profiles in DXF file format to Irregular Stocks. (Incidentally the format for .stk and .vec are quite similar)

Similarly, it also allows user to convert back irregular stocks (.STK file format) into DXF format.

Select the ***ConvertIrStock*** command icon from the Nest Manager icon menu. The following dialog box will appear:



Ir-Stock Directory	Display the default Ir-stock directory set at ***Sysdata*** In this case, it is also the target directory where all converted file will be saved.
DXF file Directory	To type in or click on the Browse button to choose a directory where the source file are located.
Convert DXF to STK	Check this radio button to convert DXF file format to Irregular Stock (.STK).
Convert STK to DXF	Check this radio button to convert Irregular Stock (.STK) file format to DXF.
Available DXF /STK File	Display a list of available files found in the Parts Directory (This will depends on which conversion has been chosen). You can select one or more files to be converted by highlighting the filenames and then the > button. Click the >> button to select all files.

Selected DXF /STK File	Display a list of files selected for the conversion. You can select the filenames and click the < button to remove the files from the "Selected Parts" list (but the files still remained on the "Available Parts" list). Click the << button to remove all files. Click the Convert button to initiate the process of conversion.
Ignore Holes and cut-outs	If this check box is marked, holes and cut-outs will not be converted.
Converted STK/ DXF File	This will show files that have been converted successfully.
View Error	Click this icon to view error messages, if any. This is especially helpful as it will give a list of the filenames that cannot be converted for certain reasons.

5.5 TaskEdit

In ***TaskEdit***., three (3) categories of information are required:

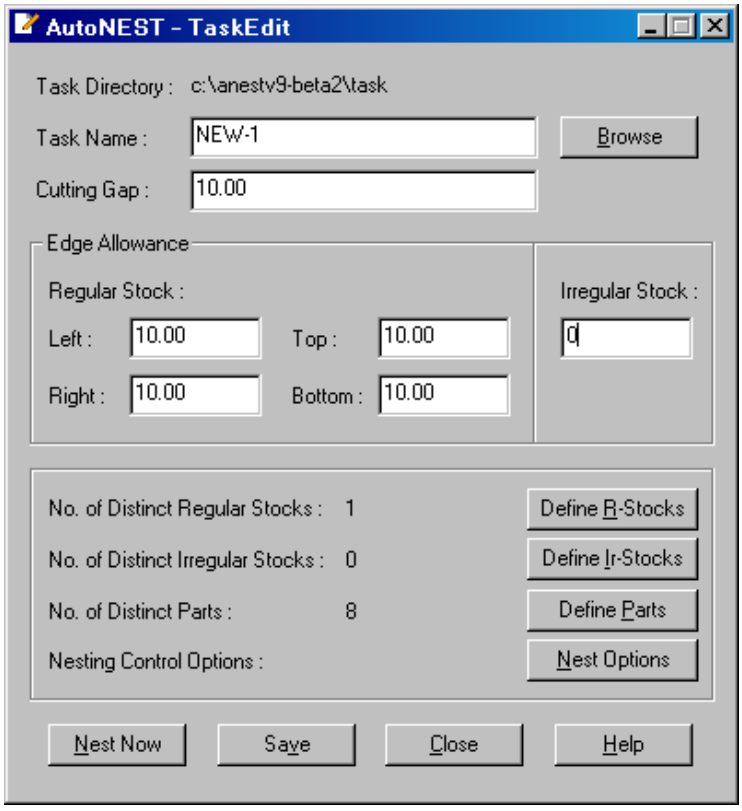
- Stock sheet (regular and irregular stocks accepted)
- Parts to be nested
- Nesting Conditions and Options

Stock sheet information includes the number of distinct stocks, size and quantity of each distinct stock. *Auto*NEST can handle both rectangular stocks of fixed size and irregular-shaped stock sheets. For tasks that nest **one** part with fixed quantity, *Auto*NEST will allow "stretchable" rectangular stocks in rolls or reels.

Information relating to the number of parts, the quantity to be nested for each part and orientation constraint …etc will also be defined in ***TaskEdit***. Cutting information such as cutting gap, x-y edge allowances are also definable.

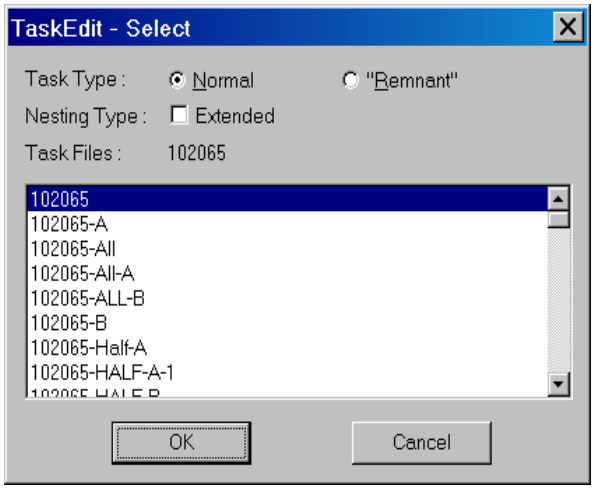
There is a new "**Nest Now**" button within the dialog box for nesting. Instead of clicking the ***Nesting*** command, the user can create/ edit Tasks and go direct into nesting.

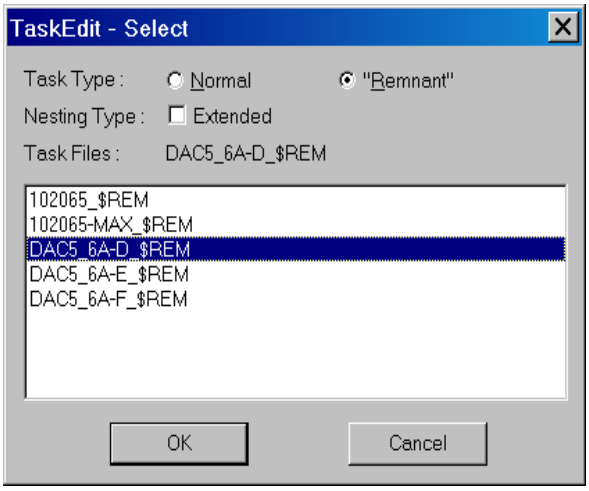
Select the ***TaskEdit***. command either from the icon menu or the *Auto*NEST pulldown menu. The following dialog box will appear:



Explanation of the ***TaskEdit*** dialog box is given below:-

Task Name	Each task is given a user-specified name for future reference (.job). You can enter up to max. 31 characters (space and dot characters are not accepted). Enter a new task name or click Browse to select an existing task. You will see the Pop-Up Window below (left). Select the task file and click the OK button. Click the "**Remnant**" radio button and you will see the Pop-Up Window (right). Display in this list box are all task names with the suffix "_$REM". You can change the existing specifications and save the new specifications into a new name or overwrite using the same task file name.



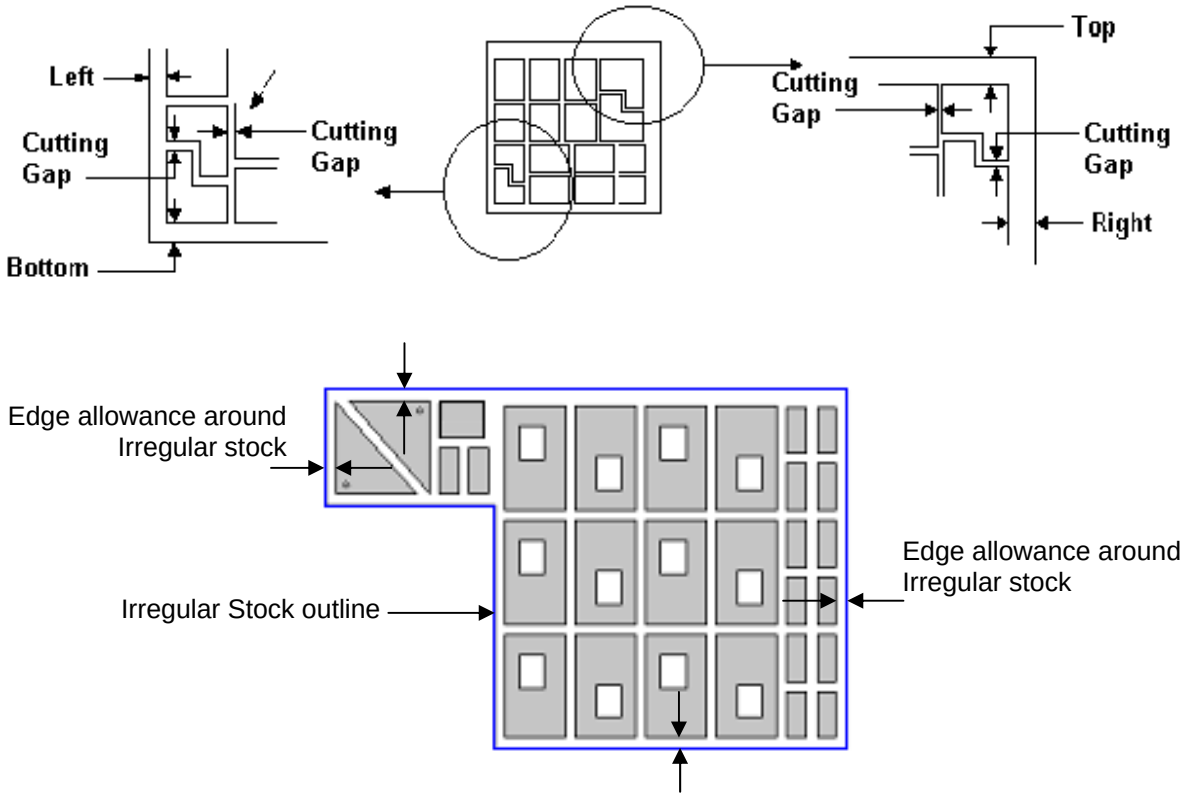


Task Type	Referring to the pop-up windows below, there are 2 selections :- • Normal • "Remnant" "Normal" tasks refer to all task files (*.job) created by the user. "Remnant" tasks refer to tasks files (*.job) with the reserved suffix, "_$REM" . For example : XYZ_$REM.job. These tasks are created automatically when the "**Save Remnant**" checkbox is marked in the NEST OPTIONS of ***TaskEdit*** ("Nest Options" button is located at the lower-right corner of the dialog box).

Nesting Type	By default, the **Extended** check box is un-marked which means that the nesting will run its usual course. If the **Extended** check-box is marked, then the nesting time is going to be longer as the nesting algorithms will run through an additional set of routines, compare with the original and then display the better of the two results. By running the **Extended** nesting, you will get either the SAME or BETTER nested results than if you were to run without marking the check box. But there is a trade-off, **Extended** nesting will take significantly longer time to run.

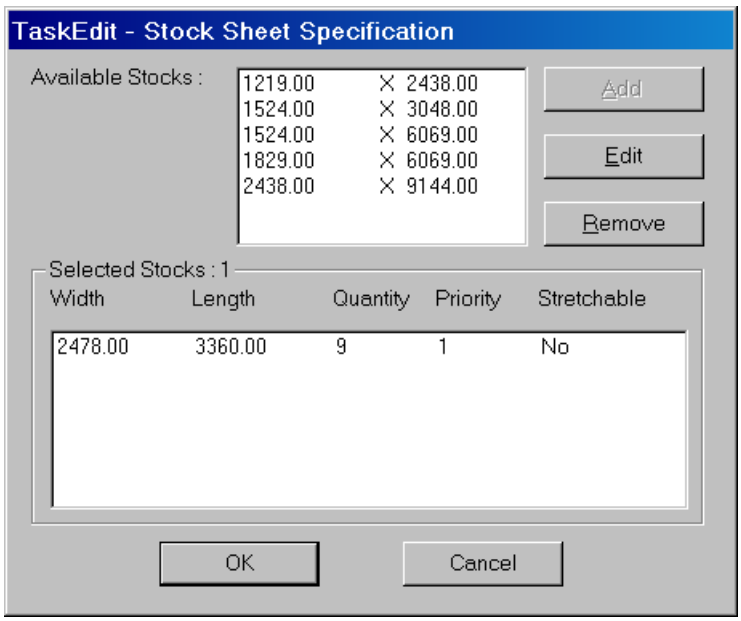
Explanation of the ***TaskEdit*** dialog box continues below:-

Cutting Gap	This is the cutting gap between nested parts to allow for the tool size.
Edge Allowance **-Regular Stock** **-Irregular Stock**	Sometimes, it is necessary to leave out an edge around the perimeter of the stock sheet. This is to cater for trimming or clamping purposes. For regular or rectangular stock, the edge allowance of the 4 sides of the stock can be defined. For irregular stock, a common edge allowance can also be defined.
Left	"Left" is the edge allowance in the x direction on the left side of stock sheet.
Bottom	"Bottom" is the edge allowance in the y direction from the bottom of the stock sheet.
Right	"Right" is the edge allowance in the x direction on the right side of the stock sheet.
Top	"Top" is the edge allowance in the y direction from the top of the stock sheet.
Irregular Stock	The edge allowance around the Irregular stock.
No. of Distinct Stocks	Number of different sizes of stock sheets. A maximum of 500 distinct stock sizes is available for the current version.
No. of Distinct Irregular Stocks	Number of different sizes of irregular stock sheets. A maximum of 500 distinct stock sizes is available for the current version
No. of Distinct Parts	Number of distinct parts to be nested. A maximum of 1000 distinct parts is available for the current version.

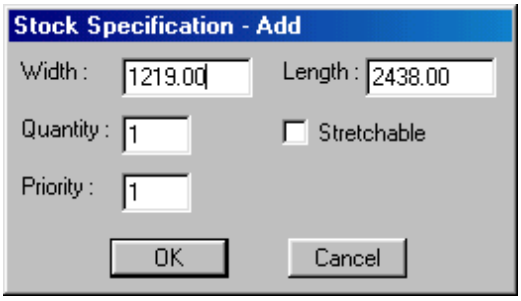


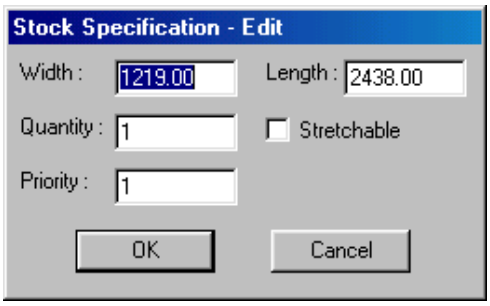
Define R-Stocks

When you click the Define R-Stocks button, the following dialog box appears.



You can add, change or delete the stock specification by clicking the Add , Edit or Remove button respectively. Highlight one of the stock size in the "Available Stock" list box and then pick the Edit button or click the Add button. The following pop-up windows will appear.

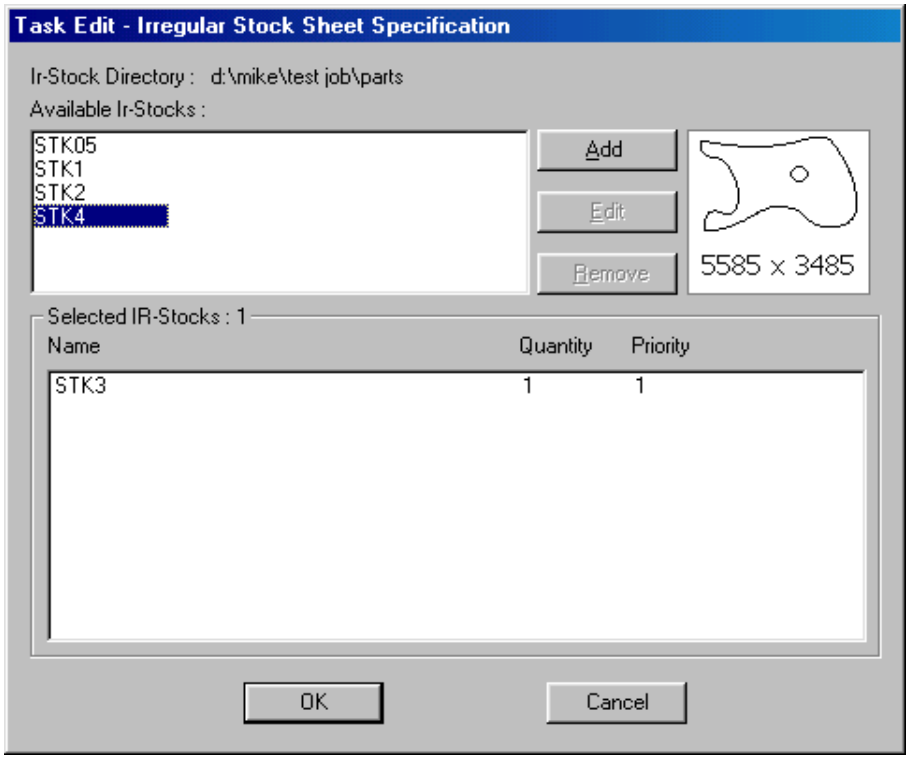




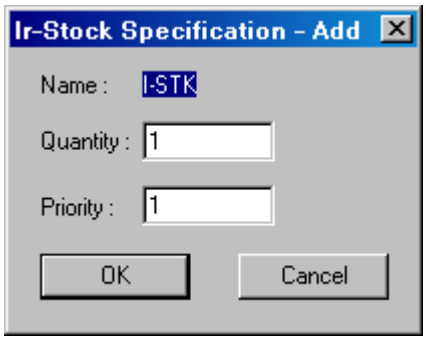
Width **Length**	The width and length dimensions of the stock sheet. For 'Imperial Units' users, you can either enter in feet and inches or purely in inches. In the latter case, the inches will automatically be converted into feet and inches if Architectural-Imperial or Engineering-Imperial units are chosen.
Quantity	Quantity of stock-sheets of that particular size to be used in the task. Maximum quantity allowed for each distinct stock is 9999.
Stretchable	For stock sheets in reels or rolls, the length of the stock sheet can be extended or stretched beyond the specified dimension to accommodate the nesting results. If 'Yes' is chosen, (mark the "Stretchable" checkbox), *Auto*NEST will have the liberty to increase the Length as much as it takes to pack-in all the parts optimally. Note this feature is currently only available for tasks, which nest only one part (Single Part Task).
Priority	The priority of using the stock-sheets when different stock sizes are available. You can define the order of priority in which *Auto*NEST should use the stock sheets. **1** has the highest priority. **99** has the lowest priority. If two or more stock sizes have the same priority number, the system will automatically decide based on the material utilization.

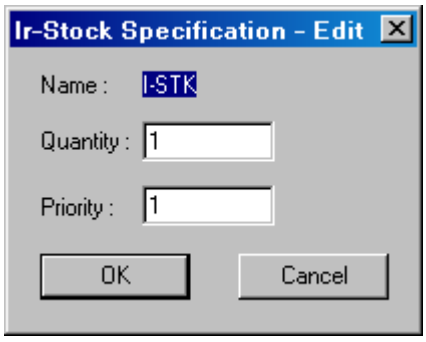
Define Ir-Stocks

By clicking the Define Ir-Stocks button, the dialog box below appears.



You can add, change or delete the irregular stock specification by clicking the Add, Edit or Remove button respectively. You can highlight more than 1 stock name and then pick the Edit button or click the Add button. The following pop-up window will appear.

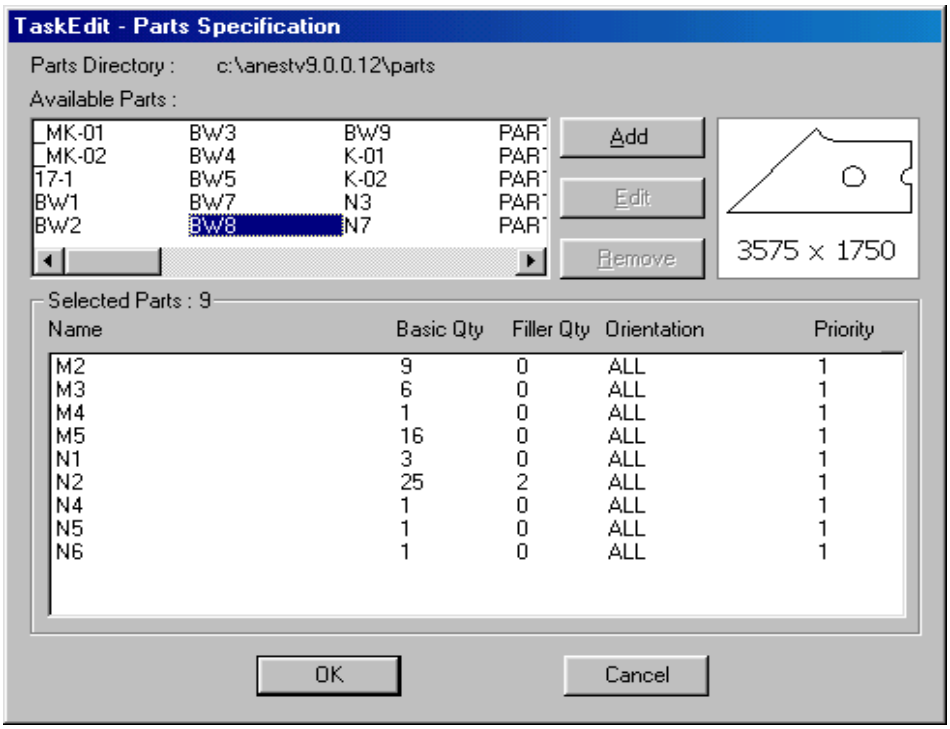




Name	Show the name of the Irregular stock (.stk). If a list of irregular stock is selected, "$$$$$$$" will appear.
Quantity	Quantity of that particular irregular stock to be used in the task. Maximum quantity allowed for each distinct stock is 9999.
Priority	The priority of using the stock-sheets when more than one is available. You can define the order of priority in which *Auto*NEST should use the Irregular stock. **1** has the highest priority. **99** has the lowest priority. If two or more stocks have the same priority number, the system will nest the smallest Irregular stock first.

Define Parts

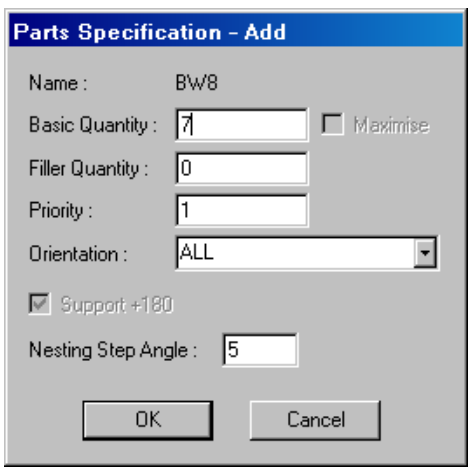
By clicking the Define Parts button, the dialog box below appears.

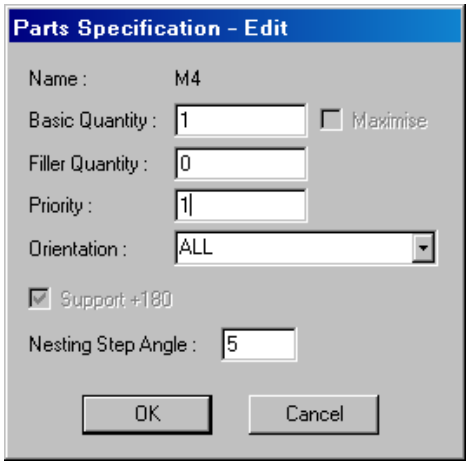


Whenever a part name from the listing of **Available Parts** is highlighted, a viewer will display the part profile with the overall dimension of the part profile. The overall length and breadth dimensions will be rounded off to the nearest integer value.

Available Parts

Display a list of parts that are available in the part directory. You can highlight a list of parts and press Add button to add them to the Selected Parts list box. The following pop-up window appears when the Add button is pressed.





Both the **Add** and **Edit** pop-up windows allow editing. The Delete button will remove the part specification from the "selected parts" list box. The Add button will place it back to the "**Selected Parts**" list.

If you select the Edit button the above pop-up windows will appear.

Explanation of the above dialog boxes is given below:

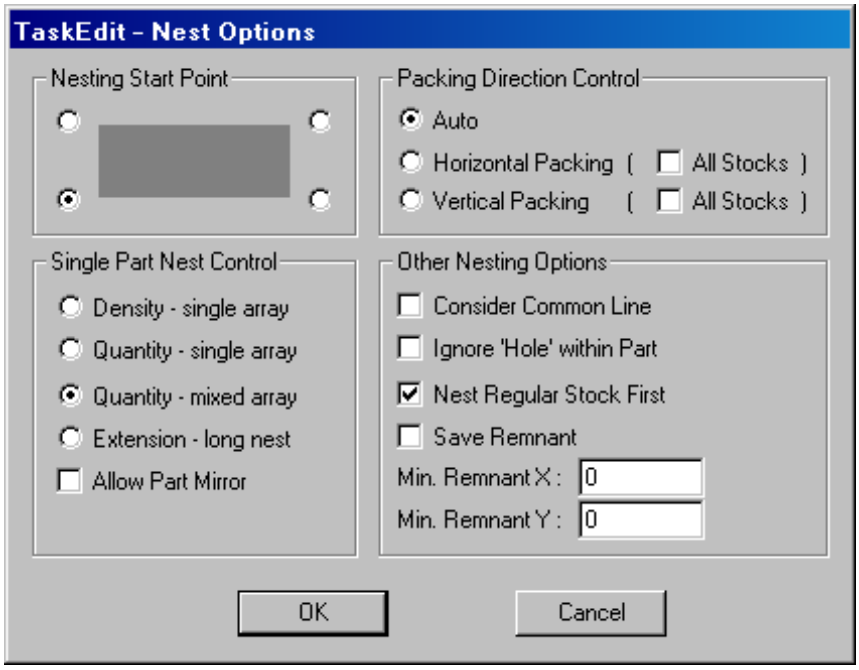
Name	Show the name of the part that you have selected. If more than 1 parts are selected, '$$$$$$$$' will appear.
Basic Quantity	Number of that particular part required to be nested. Each part has a maximum quantity of 9999.
Filler Quantity	Number of that particular filler part to be nested. Each filler part has a maximum quantity of 9999. The AutoNEST will decide how many filler parts to be utilized in order to fill the stock up to an acceptable layout. It will not exceed the amount that the user had specified.
Maximize	For single part tasks, check the '**Maximize**' check box to specify the program to fill up the whole stock sheet with the necessary quantity of parts. Not valid for stretchable stocks.

Maximize	For single part tasks, check the '**Maximize**' check box to specify the program to fill up the whole stock sheet with the necessary quantity of parts. Not valid for stretchable stocks.
Priority	The priority of each and every part to be nested. **1** has the highest priority. **9999** has the lowest priority. AutoNEST will nest according to the priority settings i.e. parts of Priority 1 will be nested first, followed by Priority 2, then 3 and so on. If two or more parts have the same priority, AutoNEST will decide automatically which part is to be nested first.
Orientation	To allow for orientation constraints of the part during nesting. **0** -- No rotation allowed. **0 90** -- 0° and 90° orientations allowed. **0 180** -- 0° and 180° orientations allowed. **0 90 180** -- 0°, 90° and 180° orientations allowed. **ALL** -- All orientations allowed. No orientation constraints. Beside the above allowable orientations, you can enter any allowable angles of orientation
Support + 180	Mark the check box, to allow the part to orientate to the specified allowable angles and their +180° combinations. This option is not applicable when **Orientation=ALL**.
Nesting Step angle	To allow a part to orientate step-incrementally in the defined angle during nesting.

Nest Options

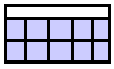
Click the

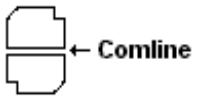
command button to bring up the dialog box as shown.



This dialog box allows the user to define some control parameters for specific nesting output requirements.

The default settings are recommended for all users who do not require special nesting output conditions. The options available are explained as follows:

Nesting Start Point	4 nesting start points are available depending on the user's nested output requirements. Click one of the 4 corner points to set start point. Point chosen shall remain as default until it is changed.
Packing Direction Control	It is recommended for the packing direction to be set to '**Auto**'. However, if required either "Horizontal Packing" (pack along the x-axis) or "vertical packing (pack along the y-axis) can be selected.
Auto	AutoNEST will automatically decide the best packing direction based on the material utilization of the nesting. This is the default setting..
Horizontal Packing 	When this radio button is marked, only the last nested layout will be packed horizontally. However, when the "**All Stocks**" check box is marked, then all the nested layouts will be packed horizontally. See illustration on Page 5-26.

Vertical Packing	When this radio button is marked, only the last nested layout will be packed vertically. However, when the "**All Stocks**" check box is marked, then all the nested layouts will be packed vertically. See illustration on Page 5-26.
Other Nesting Options	The nesting options are:- • **Consider Common Line** • **Ignore 'Hole' within Part** • **Nest Regular Stock First**. • **Save Remnant** • **Min Remnant X / Y** They are explained as follows:-
Consider Common Line 	Select this option if you want *Auto*NEST to consider packing of the parts along their common edges. This feature will save cutting time. However, *Auto*NEST will consider the common line packing together with the quality of the nesting.
Ignore 'Hole' within Part	Mark this check box to ignore all "holes" and cut outs within Parts during nesting. So that no parts will be packed into these "holes" or cut-outs.
Nest Regular Stock First	Mark this check box to nest regular stocks first. The default is to nest irregular stocks first.
Save Remnant	Mark this check box to save the remnants of the stocks automatically after every nest, as long as they are of the minimum X and Y size or more. (The original profile of the rectangular stocks will also be saved with the remnants) By default these remnants will be saved into the Part/ Irregular Stock directory. The names of the remnant stocks will be *Taskname_$REM1-1.stk*, *Taskname_$REM2-1.stk*, *Taskname_$REM2-2.stk* and so on. The naming convention is as follows :- *_$REM(LAYOUT_NO)-(NO) In addition, a Task will automatically be created bearing the Taskname_$REM.job. To view "Remnant" tasks click the Task Type radio button "**Remnant**" when selecting tasks in the **TaskEdit** dialog box.

Min. Remnant X Min. Remnant Y	The minimum remnant dimensions in length (x-dimension) and breadth (y-dimension). The default dimension is 600 x 600. The maximum value is limited to 6 digit (Eg. 999999)
Single Part Nest Control	This portion of the dialog box will be grey-out unless the Task consists of only ONE Part. For Single-part nesting, there are 5 options or controls. They are:- • **Density-Single array** • **Quantity- Single array** • **Quantity-Mixed array** • **Extension-Long Nest** ☐ **Allow Part Mirror** The illustrations on Pages 5-27 to 5-28 will give you a better understanding of these control settings.
Density-Single array	The most-dense packing pattern in a single array.
Quantity- Single array	The highest quantity of parts nested in a single array.
Quantity-Mixed array	This is the default option. Maximum quantity of parts nested onto the stock sheet.
Extension-Long Nest	This nesting option will take the longest time compared with the other three. It will go through more iteration to produce either the same or better results than Quantity-Mixed array.
Allow Part Mirror	If this option is checked, the nesting will consider the part (single) and its mirrored image during the nesting. "Allow Part Mirror" can be used in conjunction with any of the other 4 options

TaskEdit - Users can enter multiple tasks but

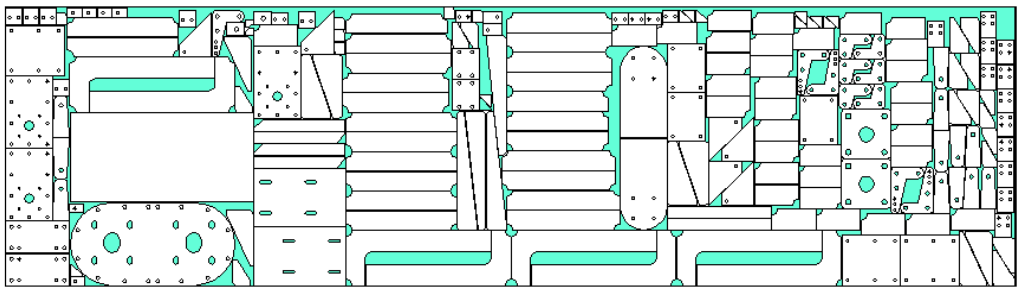
each task at a time. To exit, click

button. For every task created, there is a corresponding file with extension *.***JOB** being written on the default Task directory set at the ***Sysdata***. For example:

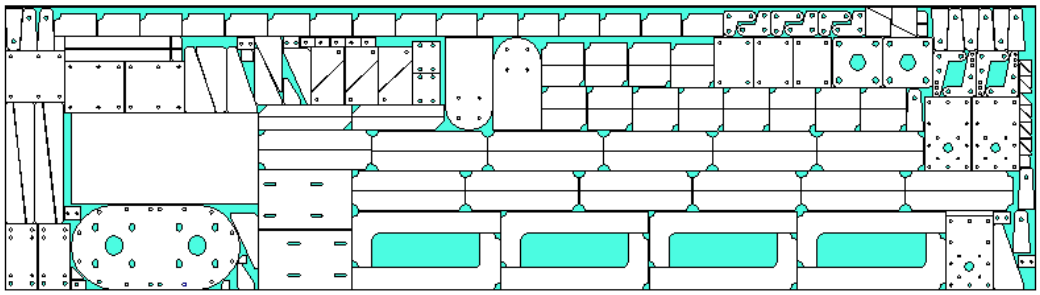
Task Name : *SAMPLE*
Filename : *SAMPLE.JOB*

Illustrations for Packing Direction Control

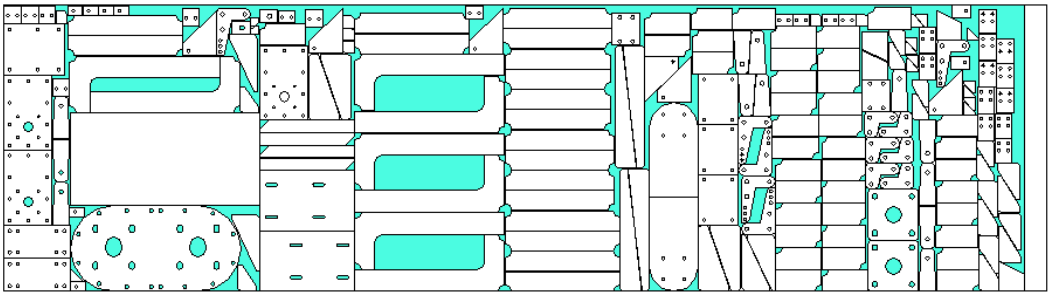
AUTO Packing



Horizontal Packing

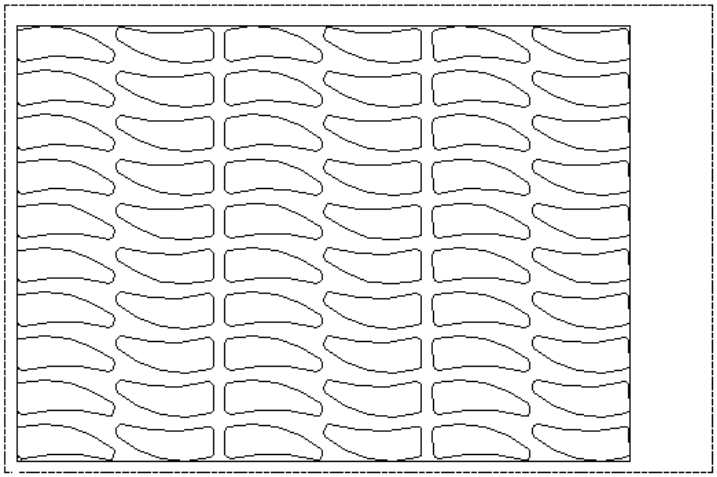


Vertical Packing

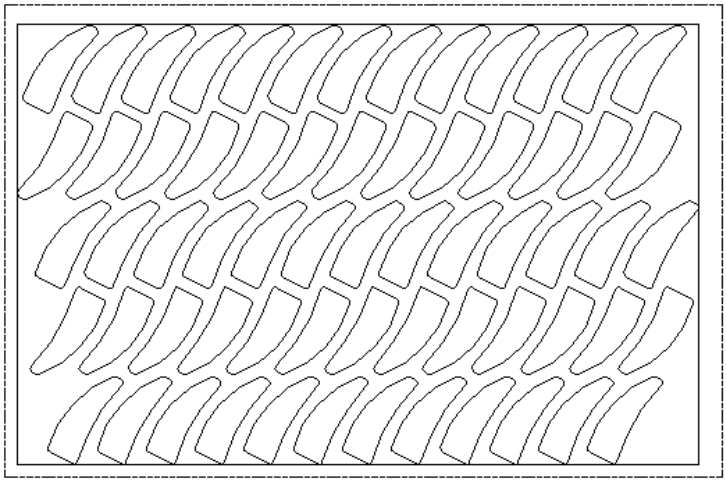


Illustrations for Single Part Nest Control

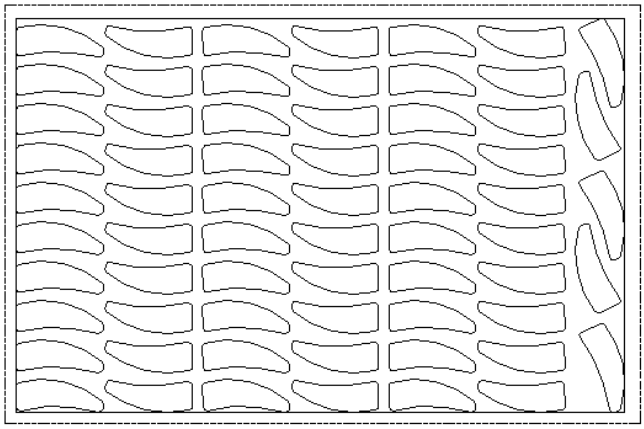
Density - Single Array



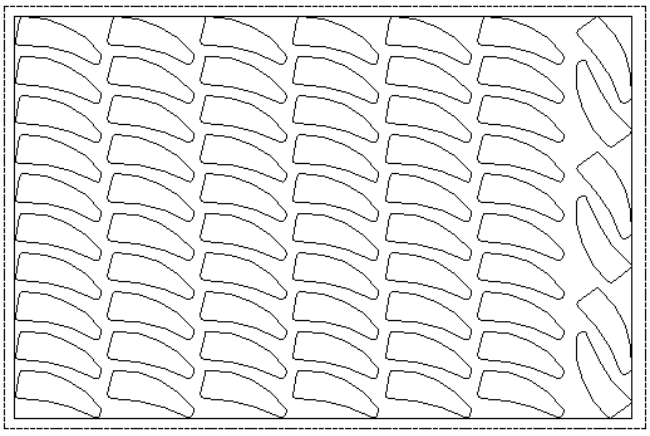
Quantity - Single Array



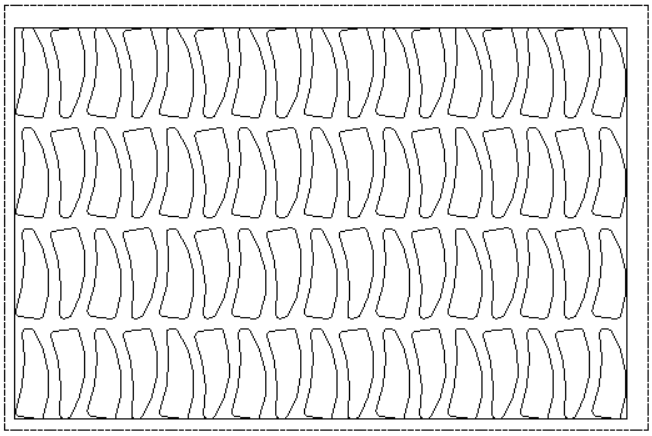
Quantity - Mixed Array



Extension- Long Nest



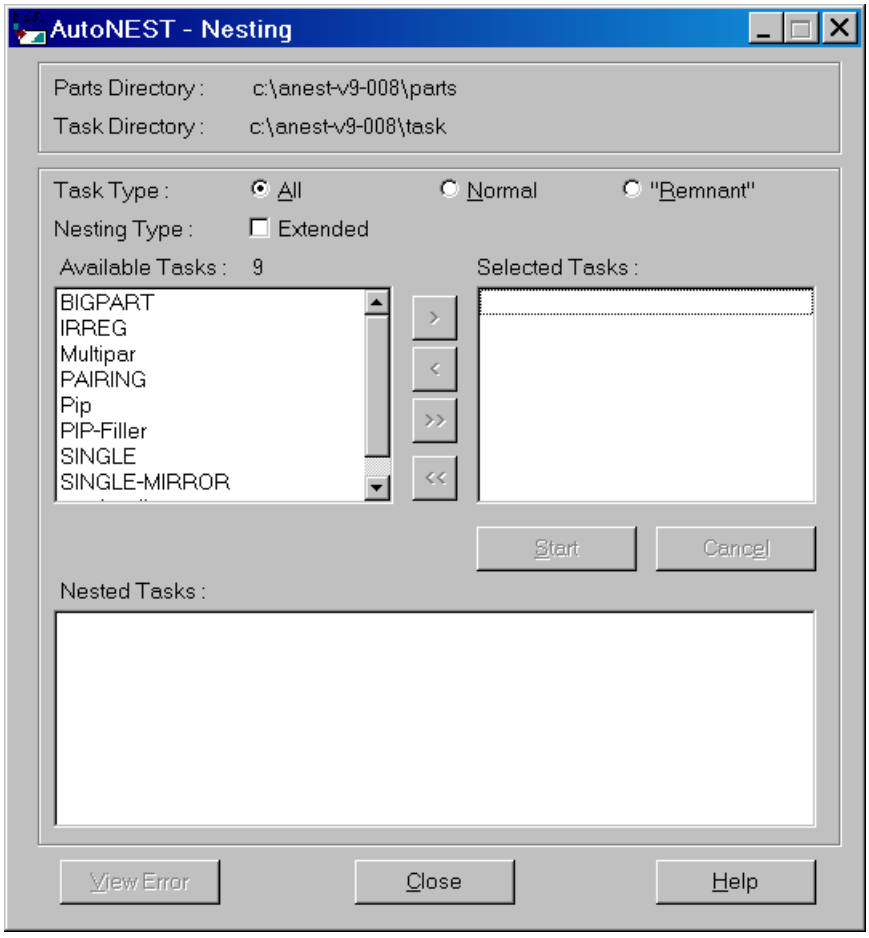
Allow Part Mirror (coupled with the Quantity-Mixed Array option)



5.6 Nesting

Nesting enables you to selectively nest the task(s) that you want. At times you may like to nest a series of tasks overnight or during a short break. This facility is also available via the ***Nesting*** command. To view the nested tasks, open the taskname.dxf file(s) from the current Task Directory.

Select the ***Nesting*** command icon from the icon menu. The following dialog box will appear :-

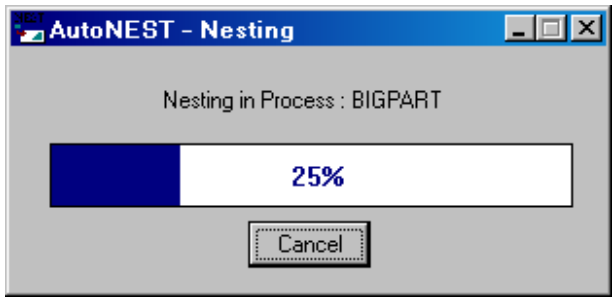


Parts Directory	Display the default part directory as set in the ***Sysdata***.
Task Directory	Display the default task directory as set in the ***Sysdata***.

Task Type	There are 3 radio buttons:- • All • Normal • "Remnant" "All" refers to all task files (*.job) residing on the current Task directory. "Normal" tasks refer to all task files (*.job) created by the user. "Remnant" tasks refer to tasks files (*.job) with the reserved suffix, "_$REM" . For example : XYZ_$REM.job. These tasks are automatically created if the **"Save Remnant"** check box in the **Nesting Options** of ***TaskEdit*** is marked. For more details, refer to Chapter 5.5 ***TaskEdit.***
Nesting Type	By default, the **Extended** check box is un-marked which means that the nesting will run its usual course. If the **Extended** check-box is marked, then the nesting time is going to be longer as the nesting algorithms will run through an additional set of routines, compare with the original and then display the better of the two results. By running the **Extended** nesting, you will get either the SAME or BETTER nested results than if you were to run without marking the check box. But there is a trade-off, **Extended** nesting will take significantly longer time to run.
Available Tasks	Display a list of tasks (***.JOB***) files found in the task directory. You can select one or more tasks to be nested by highlighting the filenames and then the button. Click the button to select all files.
Selected Tasks	Highlight the tasks and click the button to remove them from the "Selected Tasks" list (but the files still remained on the "Available Tasks" list). Click the button to remove all files from the list box.

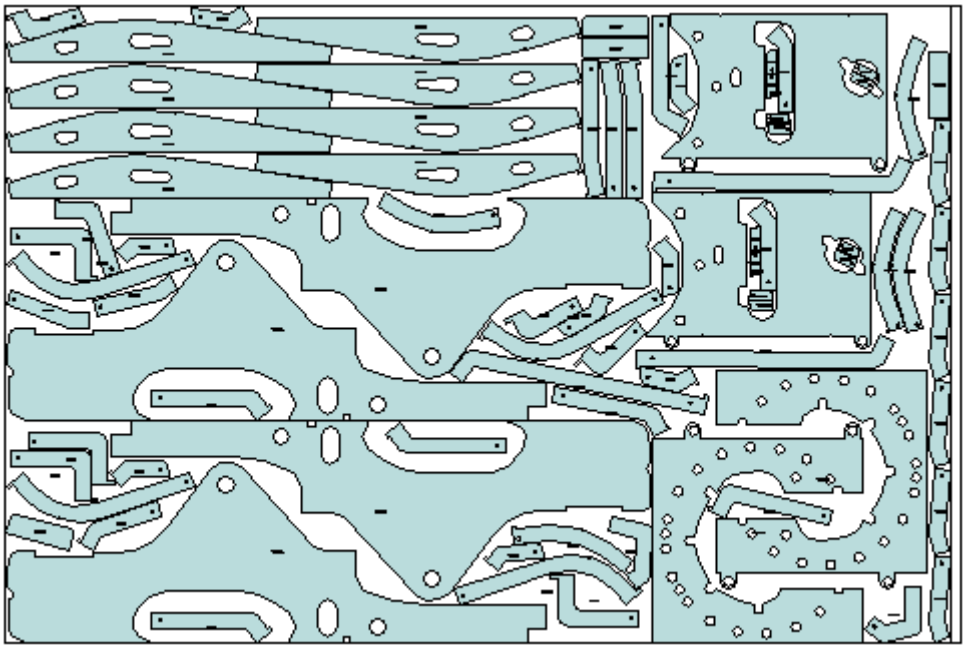
Nested Tasks	Display a list of successfully nested task files. You can click the View Error button to see if there is any error message. Internally, once a task has been successfully nested, two output files are created. These files have the same name as the task but different file extensions as shown below. Example : Task name is *SAMPLE* Output Files: *SAMPLE.SYM* *SAMPLE.SUM* The *.SYM* file contains the results of the nesting in terms of each part and its location in the layout. The format of the file is described in detail in Chapter 6. The *.SUM* file contains the nesting summary report in TEXT format.

Once the tasks are selected, click the Start button. The dialog box below will appears to indicate the nesting is in progress.

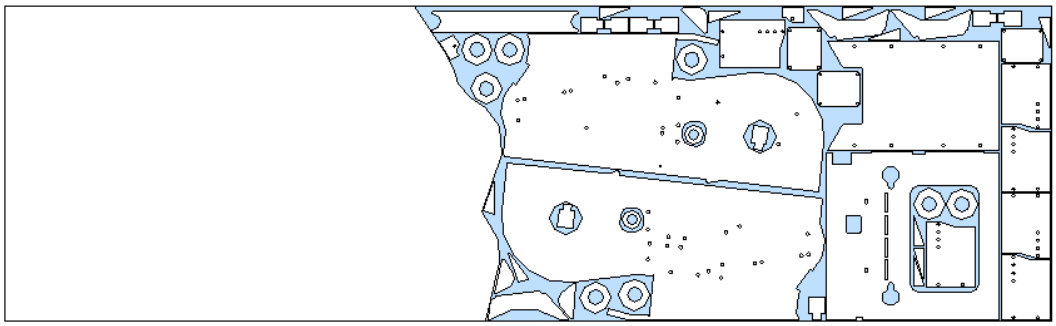


The nested results are saved in DXF files bearing the same name as the Tasks. To view the nested tasks, open the taskname.dxf file(s) from the current Task Directory.

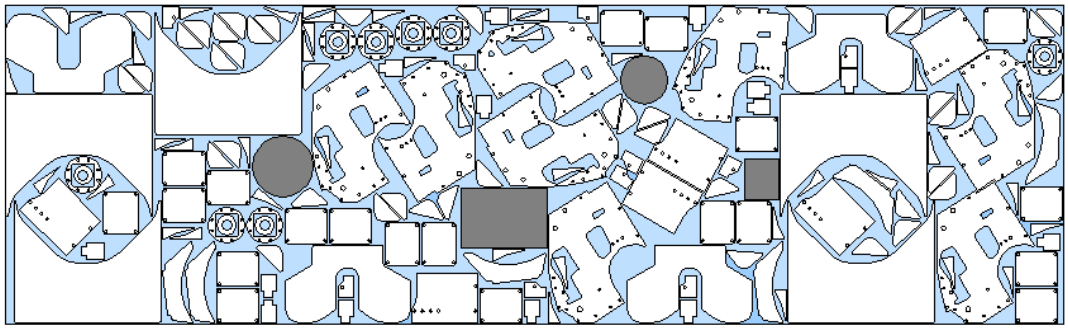
Examples of Nested Layouts



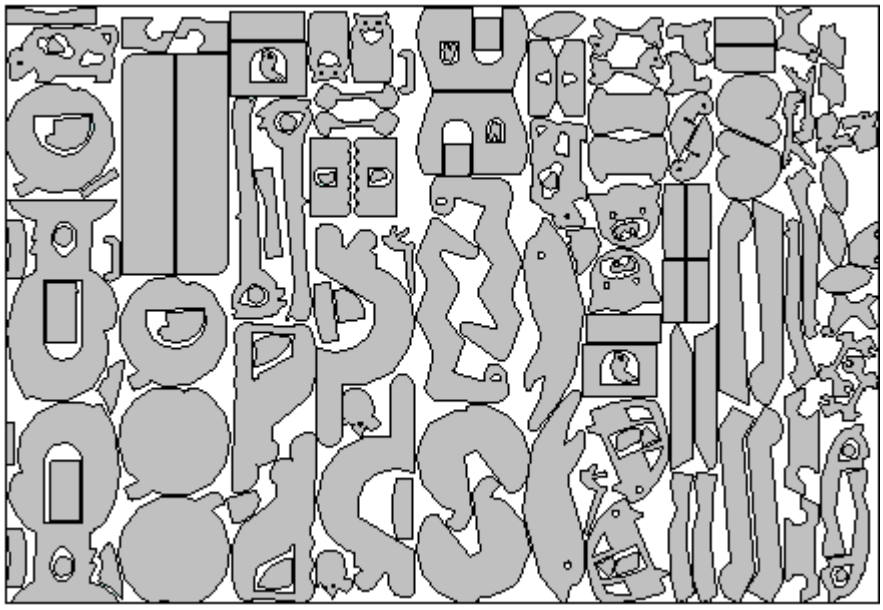
Regular Stock Nesting



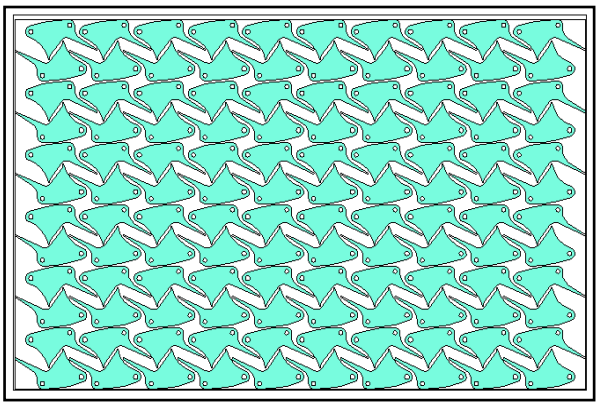
Irregular Stock Nesting



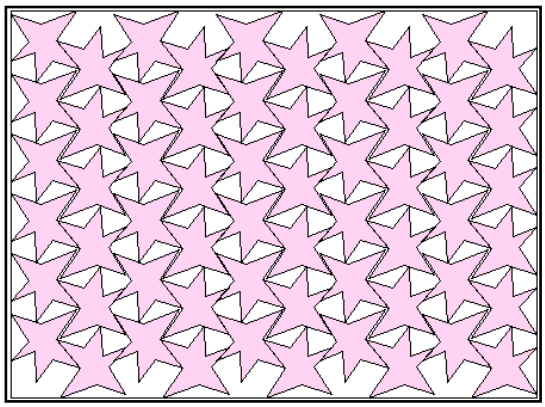
Irregular Stock Nesting (with mark-outs)



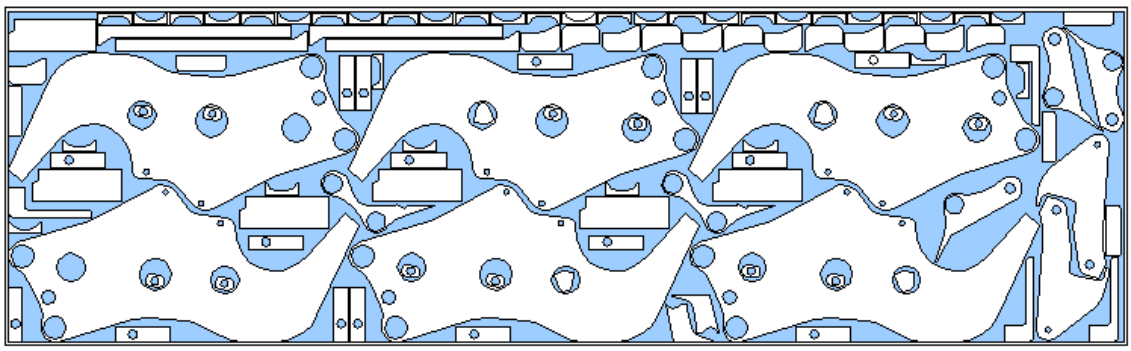
Nesting of Multiple parts



Nesting of Single Part



Nesting of Single Part



Nesting of Multiple Parts

6. File Format

In order to establish an open architecture for users to have full flexibility in using *Auto*NEST, various file formats must be maintained both at input levels and for output purposes.

For input, there are 3 files, namely :-

1) .**VEC** file

The ***.VEC*** file contains the geometry of a part in TEXT file format.

2) **.STK** file

The format of a ***.STK*** file is the same as the ***.VEC*** file. Where the .*VEC* describes the profile of a part, .*STK* describes the profile of an irregular stock.

3) **.JOB** file

This TEXT file contains the parameters of a task that need to be nested. For examples, number of stocks, stock size and quantity; number of parts, part quantity and orientation constraints; edge allowance, cutting gap …etc. This file is automatically created by the ***TaskEdit*** command.

Likewise, there are three (3) output files. These files are generated automatically from a successful nesting.

1) **.SYM** file

This TEXT file gives the layout information by making reference to the parts files, indicating position, orientation, color, layer…etc. - information of each part in the stock sheet.

2) **.SUM** Format

This file contains the nesting summary in TEXT format.

3) **.DXF** Format

This file contains the geometry of the nested layout with information for each and every part nested onto the stock sheet. As such, it will be very much larger in size when compared to say the ***.SYM*** file.

6.1 .VEC Format

Each ***.VEC*** is a TEXT file containing the x and y co-ordinates of vertices of part profiles arranged in **clockwise** or **counter-clockwise** direction. If some segments of the profiles are arcs, bulge values will be attached to the starting vertices of arcs, or if the profile is a circle, center point and radius of the circle will be recorded.
One example of a ***.VEC*** file is described as follows:-

```
1    #
2    # AutoNEST V9 ENGLISH
3    # Shape Name = test1.vec
4    # First pair of (x, y) is assumed to be insertion pt of the shape
5    #
6    @ Vec not Compressed
7    9.346454        7.998023
8    9.628080        11.478481
9    15.295798       8.841770
10   14.662140       3.673817
11   7.973529         3.076163
12   5.298084         8.208960
13   9.628080        11.478481
14   @ Hole 1
15   12.796370       7.857398        A   0.388339
16   10.754583       7.189432
17   11.282631       5.958967        A   -0.624107
18   13.254011       6.099591
19   12.796370       7.857398
20   @ Hole 2
21   9.804096        9.580049        C   0.868615
22   @ Hole 3
23   8.783203        7.154275
24   8.994422        4.798814
25   7.656700        6.345684
26   8.783203        7.154275
27   @ Leadin 1
28   4.838997        8.555070
29   4.982175        8.555070        A  -0.280570
30   5.211919        8.398732
31   5.298084        8.208960
32   5.146448        8.096893        A  -0.148813
33   4.951585        8.027744
34   4.817346        8.027744
35   @ Leadin 2
36   7.656700        6.345684
37   7.901215        6.345684
```

(Note: The above line numbers are strictly for referencing purposes, they do not appear in the file.)

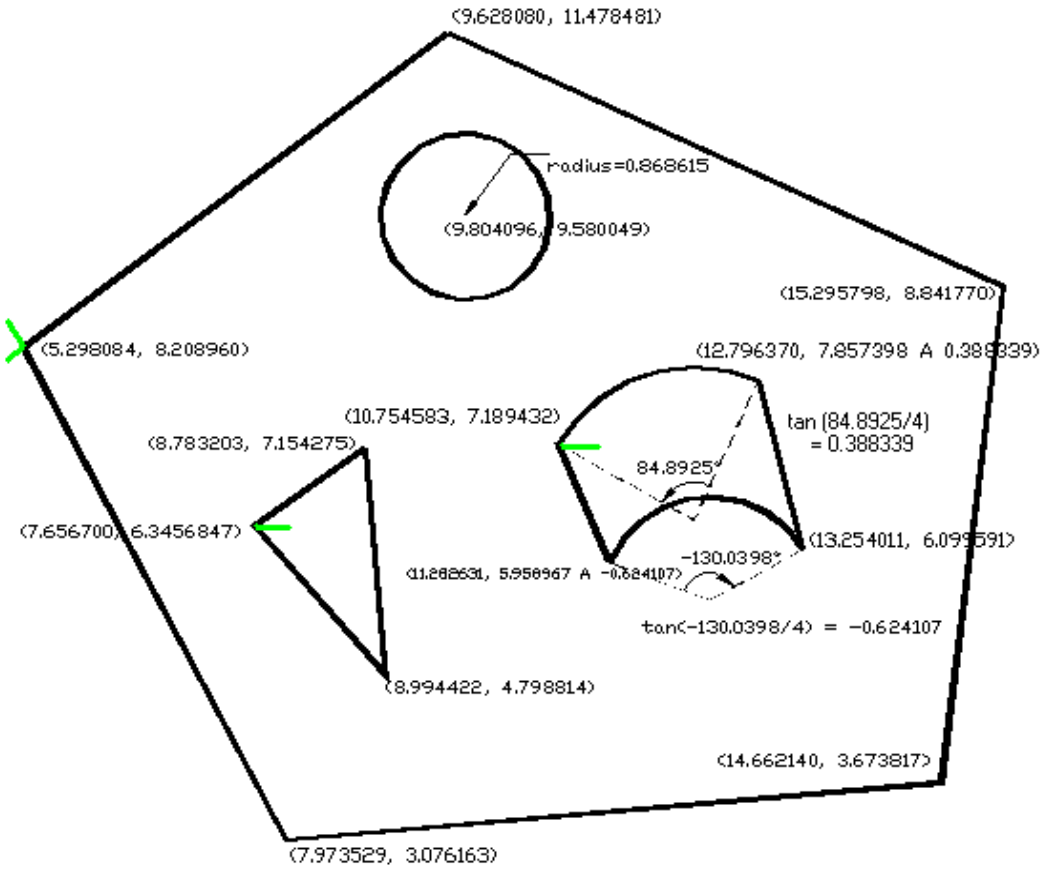
Description of ***.VEC*** File Format

Line 1 to 5	Lines start with "#" character denote comments. There is no limit to the number of comment lines. The '**AutoNEST V9 English'**, must be in one of the comment lines. The **'V9'** reference number is used to check the different formats of (***.VEC***) files of different software releases. '**English**' indicates what language version of current *Auto*NEST you are using.
Line 6	**'@ Vec not Compressed'** is a file header identifier to indicate this vec part file has not been compressed. It will be followed by a section - describing the external profile of a part.
Line 7	First pair of co-ordinates is always assumed to be the part's insertion point. X and Y co-ordinates in real number. No restrictions on the length of field.
Line 8-13	X and Y co-ordinates of each vertex of the external profile. X and Y co-ordinates in real numbers. No restrictions on the length of field.
Line 14	**'@ Hole 1'** is a file header identifier to indicate the starting of an internal hole profile section of this part. '**1**' is the hole number of a part.
Line 15 - 19	**'A'** indicates Arc ***15*** *12.796370 7.857398 A 0.388339* The first two real numbers are X- and Y- coordinates of starting point of an arc, the last real number is the bulge value of the arc. The ending point of the arc will be the first two real numbers at the following line. If the following line is starting with '@', the ending point will lie in the first line of this section This section means the first hole is a polygon with two arcs.
Line 20	**'@ Hole 2"** indicates the starting of second hole profile section of this part. This hole number is 2.

Line 21	**'C'** indicates circle. *9.804096 9.580049 C 0.868615* The first two real numbers are X- and Y- coordinates of center point of the circle. The last real number is radius of the circle. That means the second hole is a circle.
Line 22	**'@ Hole 3"** indicates the starting of third hole profile section of this part. This hole number is 3.
Line 23-26	A list of X- and Y- coordinates of each vertex of a polygon.
Line 27	"@Leadin 1" indicates the starting of one leadin / leadout section of part profile (in this example, it is for external profile).
Line 28-34	A list of X- and Y- coordinates representing the leadin / leadout lines or arcs. **'A'** indicates **Arc** - same as the foregoing.
Line 35-37	Other leadin / leadout for part inner profiles.

Notes on overall geometry of Part

- ☑ Each profile of geometry must be closed.
- ☑ No crossing over on each profile itself or between profiles.
- ☑ Not more that 1500 vertices per profile, including the starting and ending vertices of arcs.


(9.628080, 11.478481)
radius=0.868615
(9.804096, 9.580049)
(15.295798, 8.841770)
(5.298084, 8.208960)
(12.796370, 7.857398 A 0.388339)
(10.754583, 7.189432)
tan (84.8925/4)
= 0.388339
(8.783203, 7.154275)
84.8925°
(7.656700, 6.3456847)
(13.254011, 6.099591)
-130.0398°
(11.288631, 5.956967 A -0.624107)
tan(-130.0398/4) = -0.624107
(8.994422, 4.798814)
(14.662140, 3.673817)
(7.973529, 3.076163)

6.2 .STK Format

Each ***.STK*** is a TEXT file containing the x and y co-ordinates of vertices of an irregular stock (ir-stock) profile(s) arranged in **clockwise** or **counter-clockwise** direction. If some segments of the profiles are arcs, bulge values will be attached to the starting vertices of arcs, or if the profile is a circle, center point and radius of the circle will be recorded. One example of a ***.STK*** file is described as follows:

```
1    #
2    # AutoNEST V9 ENGLISH
3    # Shape Name = irstk5.vec  _anest_.dxf
4    # First pair of (x, y) is assumed to be insertion pt of the shape
5    #
6    @ Vec not Compressed
7     5536.235396 2990.376451
8     5873.082676 4446.162743
9     6006.813023 4018.838111
10    6528.361479 3164.188822
11    7504.593093 2950.526519
12    8204.423336 2536.555764
13    8204.423336 1214.119803
14    4398.551137 1214.119803
15    4397.719382 4472.870521
16    5873.082676 4446.162743
```

(Note: The above line numbers are strictly for referencing purposes, they do not appear in the file.)

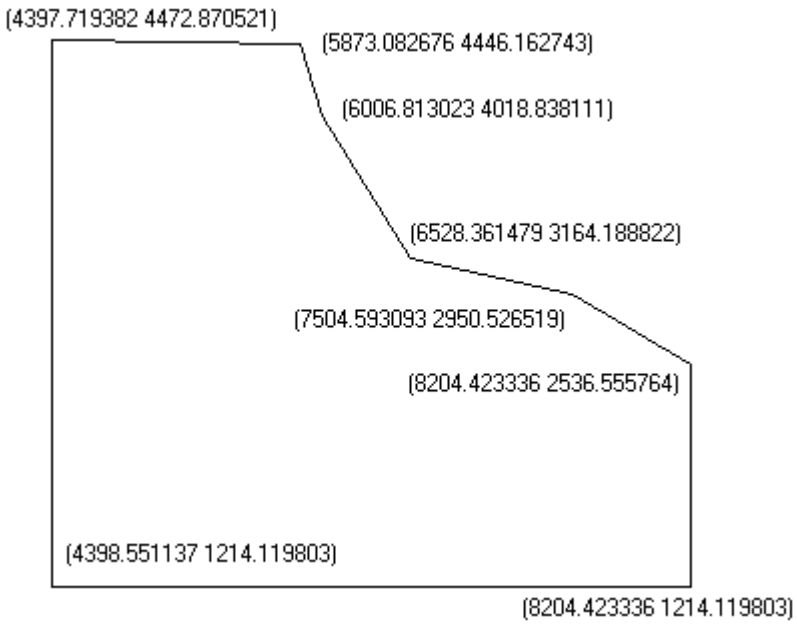
Description of ***.STK*** File Format

Line 1 to 5	Lines start with "#" character denote comments. There is no limit to the number of comment lines. The '**AutoNEST V9 English'**, must be in one of the comment lines. The **'V9'** reference number is used to check the different formats of files of different software releases. '**English**' indicates what language version of current *Auto*Nest you are using.
Line 6	**'@ Vec not Compressed'** is a file header identifier to indicate this ir-stock file has not been compressed. It will be followed by a section describing the external profile of an ir-stock.

Line 7	First pair of co-ordinates is always assumed to be the ir-stock's insertion point. X and Y co-ordinates in real number. No restrictions on the length of field.
Line 8-16	X and Y co-ordinates of each vertex of the external profile. X and Y co-ordinates in real numbers. No restrictions on the length of field.

Notes on overall geometry of an Irregular stock

- ☑ Each profile of geometry must be closed.
- ☑ No crossing over on each profile itself or between profiles.
- ☑ Not more that 1500 vertices per profile, which includes the starting and ending vertices of arcs.



6.3 .JOB Format

A ***.JOB*** file will contain all the relevant controlling parameters of the nesting for a particular task – as captured in the dialog boxes when ***TaskEdit*** is invoked. The format of the file is as follows:

```
1    #
2    # AutoNEST V9 ENGLISH
3    # Job Name = EXAMPLE1
4    # Next 6 lines = No of Distinct Shapes, No of Distinct R-Stock & I-Stock,
5    #              Cutting Gap, Edge Allowance X and X1,
6    #              Edge Allowance Y and Y1 Control Parameter
7    1
8    3 2
9    2.0000
10   5.0000 5.0000
11   5.0000 5.0000 0.0000
12   C R 1 3 0 0 1 1 600.0000 600.0000
13   60.0000 x 103.0000 10 3
14   70.0000 x 103.0000 5 1
15   80.0000 x 103.0000 20 2
16   &IRSTK 1 1 1 Y
17   &IRSTK2 1 1 Y
18   M T1 (ALL) Y Y T1 0 1 5
```

(Note: The above line numbers are strictly for referencing purposes, they do not appear in the file.)

Description of .*JOB* File Format

Line 1 to 6	Lines starting with **"#"** are comments. There is no limit to the number of comment lines. The '***Auto*NEST V9 English'** must be in one of the comment lines. The '**V9**' reference number is used to check the different formats of (.*JOB*) files for different software releases. **'English'** indicates what language version of current *Auto*NEST you are using.
Line 7	Number of distinct Parts Range : 1 to 1000

Line 8	Number of Distinct Stocks (Range: 1 to 500) The 1st digit represents the number of distinct regular stock The 2nd digit represents the number of distinct irregular stock
Line 9	Cutting gap Max field length : 14 (real nos.)
Line 10	Edge allowance [x] and [x1] (Left and right side of the stock) Max field length : 14 (real nos.)
Line 11	Edge allowance [y] and [y1] (Top and bottom of the stock) Max field length : 14 (real nos.)
Line 12	Nesting control parameters. The 1st parameter is for Single Part nesting. The 2nd is for compatibility purpose of old versions of software (not in use anymore). **The 1st parameter can be:** **'D'** -- means single part nesting with highest Density (in single array) **'M'** -- means single part nesting with Maximum quantity (in single array) **'C'** -- means single part nesting with Combination of density & maximum qty (in mixed array) **'E'** -- means extension – long nest. **The 3rd parameter is for Packing Start Point** 1 Left Bottom 2 Left Top 3 Right Top 4 Right Bottom **The 4th parameter is for Packing direction control** 1 Horizontal Packing 2 Vertical Packing 3 Auto (System Control) 4 Horizontal Packing for All Stocks 5 Vertical Packing for All Stocks

	The 5th parameter is for Common Line option

	0 Without Common Line Consideration 1 With common Line Consideration **The 6th parameter is for Mirror option (Single part only)** 0 Do NOT allow Part Mirror 1 Allow Part Mirror **The 7th parameter is for Ignore Part Hole option** 0 Do NOT ignore 'hole' of part (will nest smaller parts inside part holes) 1 Ignore 'Hole' of part (will not nest any parts inside part holes) **The 8th parameter is for Save Remnant option** 0 Do NOT save remnant stocks 1 Save remnant stocks into *.STK* files. **The 9th and 10th parameters** are for Min. Remnant Size in X and Y. Only remnant stocks that are greater than this Min. Remnant Size will be saved into .stk files onto the default Part/ Ir-Stock directory and provided the "Save Remnant" option (8th parameter) is set to 1.
Line 13 - 15	A list of distinct stocks. Each line has the following format: *Stock-Width X Stock-Length Quantity Priority*
Line 16 - 17	A list of distinct irregular stocks (ir-stock). Each line has the following format: *&ir-stock Quantity Priority Rotate-able* *'&'* is to differentiate the regular stock from the irregular stock. ***ir-stock*** will link to the *.STK* file name. The *.STK* file stores the ir-stock geometry profile. **Quantity** refers to the number of ir-stocks available for nesting. **Priority** of the ir-stock to be nested. 1 has the highest priority whereas 99 has the lowest priority. **Rotate-able** has two options. "Y" means able to rotate the ir-stock and "N" mean no rotation of the ir-stock.
Line 18	A list of distinct Parts. Number of lines depends on number of distinct Parts. Each line has the following format:

	Part-quantity Part-name (Orientation constraints) Pairing Priority Block-name Filler-quantity Support+180 step-angle **Part-quantity** – integer number (range: 1 – 9999) *(Note: for Single Part tasks of fixed size stocks, part-quantity can be '**M**' to indicate unlimited quantity of the Part)* **Part-name** – string, 30 characters long (no space characters allowed) **Orientation constraints** - combination of any angles between 0 and 360 such as (0,30, 60, 90, 180 …) or ALL. **Pairing** – 'Y' means allow part pairing. 'N' means do not allow part pairing. Currently, not in use. **Priority** – **Priority** of the parts to be nested. 1 has the highest priority, 2 has the second highest and so on. **Block-name** – Part details block name. Part detail block is a DWG file containing more detail information of the part. In the current version, it will be the same as Part-name. **Filler-quantity** – integer number (range: 1- 9999). Additional quantity for filling up available space. **Support+180** – **1** means allow the part orientation angle + 180 degree. Eg. if part allows 30 degree orientation, 30 + 180 = 210 degree will also be allowed. **O** means "No" to +180 degrees for part orientation. **Step-angle** – an incremental step angle for seeking the best nesting pattern. Reducing the step-angle will have higher chance to get a better nesting result but it will also increase the nesting time.

<u>Important</u>: **Do not use 'Tab' characters when you are constructing this file with a text editor or word processor. Instead use ordinary spaces.**

6.4 .SYM Format

All the pertinent information of the nested results are in a file with the filename extension of ***.SYM***. Assuming that the task name is *example*, it will therefore be *example.sym*.

The ***.SYM*** file is intended to be the standard vehicle for communicating with any other applications.

The format is as follows:

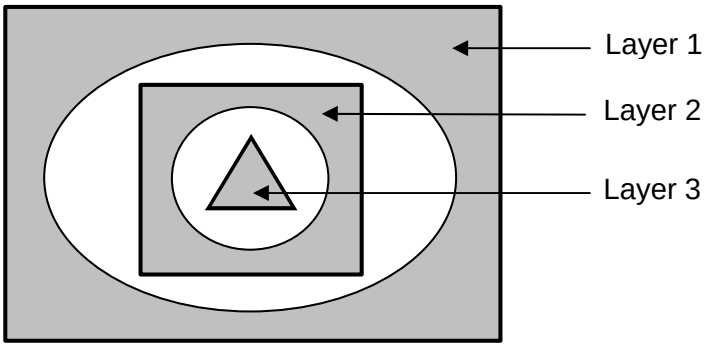
```
1     #
2     # AutoNEST V9
3     # Sym File Name = example.sym
4     # Layout from NestPro.EXE
5     #
6     #    Process          Time Taken
7     #
8     #    Input    :          0 min  0.38 sec
9     #    Pair I   :          0 min  1.49 sec
10    #    Pair II  :          0 min  0.11 sec
11    #    Packing  :          0 min  1.04 sec
12    #    Total    :          0 min  3.02 sec
13    #
14    JOB = example
15    No of Distinct Shapes = 4
16    Total No of Shapes = 18
17    Total No of Stock Sheet = 2 0
18    Encl Rect = (10.000000 10.000000) (959.675266 985.000000)
19    Stock Sheet = (1000.000000 1000.000000) x 1
20    Sum of area of shapes = 424993.32
21    (PB2 481.808601 752.658210 90.000000 2 0 1)
22    (PB4 325.031795 790.024688 225.000000 3 1 2)
23    (PB6 216.957854 839.081153 66.737425 5 1 2)
24    (PB2 204.146757 252.341790 270.000000 2 0 1)
25    (PB4 360.923563 214.975312 45.000000 3 1 2)
26    (PB6 468.997504 165.918847 246.737425 5 1 2)
27    (PB5 86.609213 368.417625 270.000000 4 0 1)
28    (PB5 82.753450 86.609213 0.000000 4 0 1)
29    (PB6 578.095177 568.065142 90.000000 5 0 1)
30    (PB6 578.095177 747.205088 270.000000 5 0 1)
31    (PB5 893.066053 82.753450 90.000000 4 0 1)
32    (PB5 737.022380 144.317798 270.000000 4 0 1)
33    Encl Rect = (10.000000 10.000000) (1002.999940 500.000000)
34    Stock Sheet = (1524.000000 2000.000000) x 1
35    Sum of area of shapes = 271150.51
```

36 *(PB2 1870.658150 38.191399 0.000000 2 0 1)*
37 *(PB4 1908.024628 194.968205 135.000000 3 1 2)*
38 *(PB6 1957.081093 303.042146 336.737425 5 1 2)*
39 *(PB2 1352.341790 481.808601 180.000000 2 0 1)*
40 *(PB4 1314.975312 325.031795 315.000000 3 1 2)*
41 *(PB6 1265.918847 216.957854 156.737425 5 1 2)*

(Note: The above line numbers are strictly for referencing purposes, they do not appear in the file.)

Description of *.SYM* File Format

Line 1 to 13	Lines start with "#" character denote comments. There is no limit to the number of comment lines. The **'*Auto*NEST V9'** must be in one of the comment lines. The V9 reference number is used to check the different formats of (*.SYM*) files for different software releases.
Line 14	**Sym file name.** The key character here is the "=" equal sign. The words before it are purely descriptive but the name after the sign is important.
Line 15	**Number of distinct parts**. The key character here is the "=" equal sign. The words before it are purely descriptive but the value after the sign is important.
Line 16	**Total quantity of parts nested.** The key character here is the "=" equal sign. The words before it are purely descriptive but the value after the sign is important.
Line 17	**Total number of distinct nested layouts.** The key character is the "=" equal sign. The words before it are purely descriptive but the 2 values (separated by space) indicate the no. of distinct nested layouts for regular and irregular stocks respectively.
Line 18 - 32	The first nested layout information.
Line 18	**Enclosing rectangle of the first nested layout.** The first pair of real numbers is the left-bottom point of the rectangle, the second pair is the length and width of the rectangle.

Line 19	**Stock sheet size and the number of the repeated layout.** Within brackets are the width and length of the stock.
Line 20	Sum of area of parts nested in the current layout.
Line 21 - 32	A list of nested parts. Each line has the following format: *Part-name X Y Angle Color Hole_no Layer* **Part name** – name of the part **X, Y, Angle** – transformation of the part, relative to the first layout's left bottom point **Color** – indicate the color to be used on screen **Hole-no** – indicate which hole the current part is being nested as the Part may have multiple holes (these are differentiated by the "Hole no." in ***.VEC*** file **'0'** means the part is NOT inside any other part's hole. **'>0'** means the part is inside a certain hole no. of the part **Layer** – the meaning is different from the Drawing layers that most of us are familiar with. Here, it means whether a part is nested in multiple levels of "Part-In-Part". The diagram below illustrates what it means to be called "Layer 1", "Layer 2", "Layer 3" and so on. 
Line 33 -41	The second nested layout information. The transformation of the part in second layout is relative to the **first layout's left bottom point** while the enclosing rectangle's coordinate is relative to the current layout's left bottom point

<u>Important</u>: Do not use 'Tab' characters when you are constructing this file with a text editor or word processor. Instead use ordinary spaces.

An **irregular stock** will have the following *.SYM* file format :-

```
1   #
2   # AutoNEST V9
3   # Sym File Name = IRREG-1.sym
4   # Layout from NESTPRO.EXE
5   #
6   #    Process          Time Taken
7   #
8   #    Input   :        0 min  0.08 sec
9   #    Pair I  :        0 min  0.68 sec
10  #    Pair II :        0 min  0.02 sec
11  #    Packing :        0 min  1.98 sec
12  #    Total   :        0 min  2.76 sec
13  #
14  JOB = IRREG-1
15  No of Distinct Shapes = 5
16  Total No of Shapes = 87
17  Total No of Stock Sheet = 0 1
18  Encl Rect = (0.000000 0.000000) (3806.703954 3258.750718)
19  Stock Sheet = (3258.750718 3806.703954) x 1
20  Stock Area =  9234599.16 Sum of area of shapes = 5673622.50
21  (&i-stk 2685.912593 1921.541344 0.0 1)
22  (17-1 3445.292074 1876.218412 11.766537 2 0 1)
23  (17-1 2854.195540 2200.574867 -168.233463 2 0 1)
24  (17-1 2163.516778 1875.891255 11.766537 2 0 1)
25  (17-1 1572.420244 2200.247710 -168.233463 2 0 1)
26  (17-1 418.622195 2774.246774 -269.985376 2 0 1)
27  (17-1 2566.064366 443.120389 -179.985376 2 0 1)
28  (17-1 2398.265618 961.253189 -179.985376 2 0 1)
29  (PART3 2117.604589 1421.560227 0.014624 3 0 1)
30  (PART3 2324.528435 1260.959391 180.014624 3 0 1)
31  (PART3 3624.289236 376.923330 267.808871 3 0 1)
32  (PART3 1849.929902 1349.789402 270.014624 3 0 1)
33  (PART3 2851.255095 1352.473314 180.014624 3 0 1)
34  (PART4 154.152797 3096.646617 270.000000 4 0 1)
35  (W19 994.017396 2813.313029 180.014624 5 0 1)
36  (W19 928.893289 1829.261109 0.014624 5 0 1)
```

The differences between regular stock and irregular stock are as follows :-

Line 19 & 20	Overall dimension of the irregular stock and the number of repeated layout(s). (Within brackets are the overall width and length)
Line 20	Area of irregular stock and Sum of area of parts nested in the current layout.
Line 21	List ir-stock name and position. The format for this line is: *&ir-stock-name X Y Angle Color* **X, Y, Angle** – transformation of the ir-stock, relative to the first layout's left bottom point. In this current version the **Angle** is always 0.0. and the **Color** always 1.

6.5 .SUM Format

The ***.SUM*** file is one of the three files created upon every successful nesting of a task.

A ***.SUM*** file will contain the same information as the Nesting Summary report when displayed on the drawing. The format is listed below:

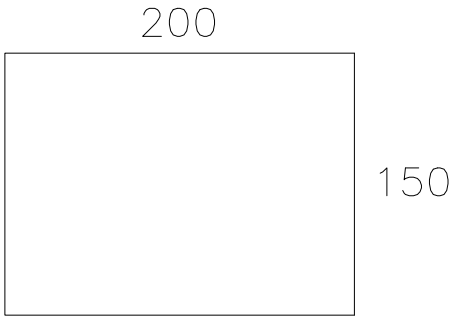
```
NESTING REPORT FROM PIP.EXE
TASK NAME :          TASK01

STOCK                STOCK #1
QTY                  1

STOCK SIZE           1000.0010x800.0000
ENCLOSING RECT       943.7744x745.7799

ENCLOSING RECT/      703847.9556/
STOCK AREA           800001.8000
                     87.98%

TOTAL PART AREA      399104.9006/
ENCLOSING RECT       703847.9556
                     56.70%
TOTAL PART
PERIMETER            34744.63

PART NO
P001          3/3
P004          2/2
P005          2/2
SUB TOTAL     7/7

NESTING SUMMARY

PART NO              BASIC QTY      FILLER QTY
P001                   3/3              --
P004                   2/2            10/100
P005                   2/2             5/50

TOTAL PARTS NESTED     7/7             15/150

STOCK                TOTAL
1000.0000x800.0000     3
TOTAL                  3
```

6.6 .DXF Format

DXF file is a popular file interchange format among PC CAD systems. Its exact structure originates from Autodesk, Inc. for the AutoCAD product. Any detailed technical reference should be made to that source.

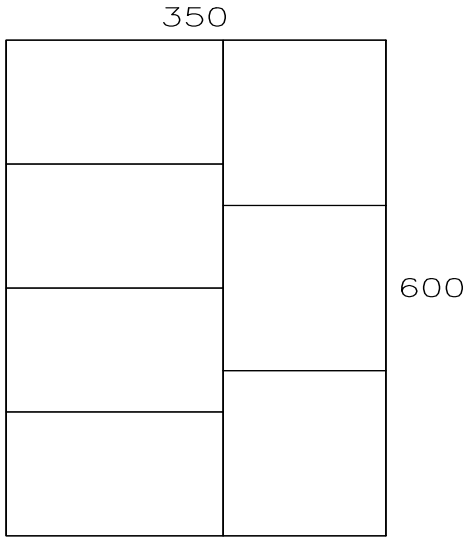
Example:

a) The following example is a ***.DXF*** file of a rectangle of 200 x 150, horizontally orientated with its lower left corner at the 0,0 origin.



Column A	Column B	Column C
0	10	21
SECTION	200.0	150.0
2	20	31
ENTITIES	150.0	0.0
0	30	0
LINE	0.0	LINE
8	11	8
0	0.0	0
10	21	10
0.0	150.0	0.0
20	31	20
150.0	0.0	0.0
30	0	30
0.0	LINE	0.0
11	8	11
0.0	0	200.0
21	10	21
0.0	200.0	0.0
31	20	31
0.0	0.0	0.0
0	30	0
LINE	0.0	ENDSEC
8	11	0
0	200.0	EOF

b) The next example is the same rectangle nested 7 times on a stock sheet of 600 x 350 (Y x X) units, zero cutting gap with the bottom left of the stock sheet inserted at 100,100 location.

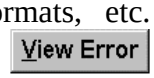


Column A	Column B	Column C
0	10	10
SECTION	450.0	100.0
2	20	20
ENTITIES	100.0	100.0
0	30	30
POLYLINE	0.0	0.0
8	0	0
TASK1	VERTEX	SEQEND
66	8	8
1	TASK1	TASK1
10	10	0
0.0	450.0	LINE
20	20	8
0.0	700.0	0
30	30	62
0.0	0.0	2
0	0	10
VERTEX	VERTEX	300.0
8	8	20
TASK1	TASK1	700.0
10	10	30
100.0	100.0	0.0
20	20	11
100.0	700.0	300.0
30	30	21
0.0	0.0	500.0
0	0	31
VERTEX	VERTEX	0.0
8	8	0
TASK1	TASK1	LINE

Column D	Column E	Column F
8	0	0.0
0	LINE	LINE
62	8	8
2	0	0
10	62	62
300.0	2	2
20	10	10
500.0	300.0	450.0
30	20	20
0.0	500.0	500.0
11	30	30
450.0	0.0	0.0
21	11	11
500.0	300.0	300.0
31	21	21
0.0	300.0	500.0
0	31	31
LINE	0.0	0.0
8	0	0
0	LINE	LINE
62	80	8
2	62	0
10	2	62
450.0	10	2
20	300.0	10
500.0	20	300.0
30	300.0	20
0.0	30	300.0
11	0.0	30
450.0	11	0.0
21	450.0	11
700.0	21	300.0
31	300.0	21
0.0	31	100.0
0	0.0	31
LINE	0	0.0
8	LINE	0
0	8	LINE
62	0	8
2	62	0
10	2	62
450.0	10	2
20	450.0	10
700.0	20	300.0
30	300.0	20
0.0	30	100.0
11	0.0	30
300.0	11	0.0
21	450.0	11
700.0	21	450.0
31	500.0	21
0.0	0	100.0
1.0	31	

Column G	Column H	Column I
31	550.0	250.0
0.0	30	31
0	0.0	0.0
LINE	11	0
8	300.0	LINE
0	62	8
62	2	0
2	10	62
10	100.0	2
450.0	20	10
20	400.0	300.0
100.0	30	20
30	0.0	100.0
0.0	11	30
11	100.0	0.0
450.0	21	11
21	250.0	300.0
300.0	31	21
31	0.0	250.0
0.0	0	31
0	LINE	0.0
LINE	8	0
8	0	LINE
0	62	8
62	2	0
2	10	62
10	100.0	2
450.0	20	10
20	250.0	100.0
300.0	30	20
30	0.0	100.0
0.0	11	30
11	100.0	0.0
300.0	21	11
21	100.0	300.0
300.0	31	21
31	0.0	100.0
0.0	0	31
0	LINE	0.0
LINE	8	0
8	0	ENDSEC
0	62	0
62	2	EOF
2	10	
LINE	300.0	
8	20	
0	250.0	
62	30	
2	0.0	
10	11	
100.0	100.0	
20	21	

7. Error Messages

There are a number of things that can go wrong during the running of *Auto*NEST, from corrupted file, wrong software versions, non-conformance of file formats, etc. Generally, these errors will be trapped by the program through enabling 

button. Click the button to display the error message. A disabled View Error button simply means no errors found during processing.

If there are errors, internally, error messages will be stored in an ASCII text file called **ANEST.ERR**. ANEST.ERR contains the name of the executing task (e.g. *DXF2VEC*, *NestPRO* etc.), followed by a brief description of the error and the actions to be taken to correct them.

Categories of Errors

We have grouped errors into the following six categories with corresponding numbering procedure.

	Error Number	**Category**
a.	100 - 199	I/O Error
b.	200 - 299	Limits Conformance Error
c.	300 - 399	File Format Conformance Error
d.	400 - 499	Warning Message
e.	500 - 599	System Error
f.	600 - 699	Fatal Error

The detailed explanation of each possible error is in an ASCII file called **ERROR.MSG**. It is structured with a prefix each error number as follows:

#E Error number with error message

#D Error number with description

#S Error number with proposed solution to overcome problem

The contents of the **ERROR.MSG** are given as below.

 # AutoNEST English Version
 # File Name : error.msg / AutoNEST Win V9 */*
 # Date: 13th June. 97
 # 100 - 199 : I/0 Error
 # 200 - 299 : Limits Conformance Error
 # 300 - 399 : File Format Conformance Error
 # 400 - 499 : Warning Message
 # 500 - 599 : System Error
 # 600 - 699 : Fatal Error

0 Press any key to EXIT

100E The hardware lock has been disconnected, removed,
100E faulty or cannot be detected.
100S 1. If hardware lock has been removed or loosened,
100S please attach the hardware lock to the computer's
100S parallel port connector.
100S 2. Install the hardware lock driver from the CD-Rom,
100S if you have not done so.
100S 3. Should the hardware lock be damaged, please report
100S to your dealer.

101E Authorization File is incompatible or corrupted.
101S 1. Please copy the original Authorization File from the
101S Install CD-Rom/Disk to the main directory where the
101S program is installed.
101S 2. If the Authorization File is incompatible, please
101S contact your dealer.

103E -
103E Can not support unlimited ('Maximise') part qty.
103S Change the unlimited part qty to be limited.

104E -
104E Can not support stretchable stocks.
104S Change the stretchable stock to un-stretchable.

105E -
105E Can not support unlimited ('Maximise') part qty for tasks
105E with multiple distinct parts.
105S Change the unlimited part qty to be limited.

106E -
106E Can not support stretchable stocks for tasks
106E with multiple distinct parts.

106S Change the stretchable stock to un-stretchable.

107E Number of distinct stock sizes can not be <=0.
107S Specify a num (>=1).

108E Number of distinct parts is greater than the actual
108E number of parts in the task file.
108E Add more parts in task file.

109E Number of distinct parts can not be <=0.
109S Specify a num (>=1).

110E Invalid number of parameters.
110E Format : program_name task_name
110E
110E Example : NESTPRO task1

112E For "SYMUPDAT", the part output format should be set to "DWG".
112S Run "SYSDATA" to re-set the option to "DWG".

114E Stretchable stock and unlimited ('Maximise') part qty
114E can not be supported at meantime.
114S 1. Either change the stretchable stock to un-stretchable
114S 2. Or change part qty "Maximise" to a fixed qty.

130E No .DXF files found in directory -
130D The AutoNEST data files cannot be found in default
130D directory. Check part directory in <SYSDATA>.

131E No .VEC files found in directory -
131D The AutoNEST data files cannot be found in default
131D directory. Check part directory in <SYSDATA>.

133E No .SYM files found in directory -
133D The AutoNEST data files cannot be found in default
133D directory. Check task directory in <SYSDATA>.

134E No .DWG files found in directory -
134D The AutoNEST data files cannot be found in default
134D directory. Check part directory in <SYSDATA>.
134D Only applicable for AutoCAD.

140E Can't open file for read -
140D The error will happen when AutoNEST cannot open
140D the data file for read.
140D Eg, In <Nesting>, please make sure that the task file
140D and the part files are in the specified default
140D directories.

141E Can't open AutoNEST file for read -
141D The AutoNEST supporting files are missing or corrupted.
141S Check the AutoNEST distribution diskettes, and re-load
141S the necessary files onto the hard-disk.

142E Can't open file for read -
142D Need to create the above data file.

143E Authorization file not found.
143S Please consult your dealer.

144E All concurrent user licenses are currently being used.
144S Please run the program later or contact your dealer to
144S increase the network concurrent user licenses.

145E Your current license is not for this product.
145S Please contact your dealer.

146E Your trial license for this product has expired.
146S Please contact your dealer.

147E This program has not been authorized.
147S To authorize this program, you need to submit the "SITE CODE"
147S to Radan Systems by clicking "ABOUT" from the AutoNEST menu.
147S For more details on program authorization, please refer to
147S the README.TXT or README.DOC file.

150E Can't open file for write -
150D The error will happen when AutoNEST cannot open
150D the data file or supporting file for write.
150S 1. Run Out of File Handle, increase the "FILE" field in
150S config.sys.
150S Eg FILES=20
150S 2. Hard Disk Full.

151E Can't open file for append
151D The error will happen when AutoNEST cannot open

151D the data file or supporting file for write.
151S 1. Run Out of File Handle, increase the "FILE" field in
151S config.sys.
151S Eg FILES=20
151S 2. Hard Disk Full.

153E The AutoNEST file is corrupted -
153E Check the AutoNEST distribution diskettes, and re-load
153E the necessary files onto the hard-disk.

154E The file is corrupted -
154S Report to AutoNEST dealer

155E The following part(s) cannot be found in the job file.

156E No part found in the job file.

157E No part selected.

158E No stock selected.

159E Cannot find job file, therefore ViewNEST terminates here.

201E No suitable stock size at all
201D During nesting if all the declared stock sizes are
201D found to be too small to nest even one or a pair
201D of the smallest part in the task, this message will
201D be displayed.
201S Either increase the stock sheet size or nest smaller parts.

202E Number of distinct parts exceeds 1000.
202D The number of distinct parts submitted in the task file
202D has exceeded the limit of 1000.

203E Number of distinct stocks exceeds 500.
203D The number of distinct stocks submitted in the task file
203D has exceeded the limit of 500.

204E Part profile has more than 1500 vertices -
204D The number of vertices in one of the profile of the part
204D has exceeded the maximum number allowed : 1500.

205E Ir-stock profile is out of processing limit.
205D This may be due to too many vertices in the ir-stock
205D profile or too many holes defined inside the ir-stock.
205S Please simplify the ir-stock profile or try to reduce
205S the no of holes inside the ir-stock.

300E Incompatible AutoNEST version -
300D Error happens when data file is from a different version
300D of AutoNEST. For eg, the data file for AutoNEST V9
300D will contain the following comment line :
300D "# AutoNEST V9"
300D The Release no is used to check the compatibility of
300D different formats of data files between different releases.
300D AutoNEST provides downward compatibility for all the
300D data files.
300S Please make sure all the files are not corrupted and

300S the Release No is properly designated.
300S If the file is corrupted, re-create the file.

306E Profile has ZERO area -
306D The profile is not closed , or too small, or is a straight line.
306S Either re-create the part or change the aperture value
306S in ANEST.TOL.

307E Profile has lines that CROSSES over -
307D The profile has some intersection lines.

307S Either re-create the part or change the aperture value
307S in ANEST.TOL.

308E Profile has multiple SAME point -
308S Either re-create the drawing or change the aperture value
308S in ANEST.TOL.

312E Profile is an ACAD Block - need to EXPLODE
312D Only applicable for AutoCAD
312S Re-create the drawing.

313E Profile contains SPLINE segment -
313D AutoNEST cannot accept profile with "SPLINE" segment

314E Cannot convert DXF file -
314D No profile can be detected on the LAYER or of the COLOR
314D that are specified in the SYSDATA "Input Part/Ir-Stock - Layer Setting".

315E Part has TOO MANY EDGES -
315D The constraints for vector compression is too tight.

315S Change the constraints in ANEST.SYS.
315S Either decrease minimum vector, increase total area, or
315S increase relative global tolerance.

340E Invalid file format for -
340S Need to re-do

341E Invalid file format for AutoNEST supporting file -
341S Need to re-load from Diskette

345E Cannot find "ANEST" layer in .DXF file -
345S Need to save blocks in "ANEST" layer.

350E Cannot find BLOCK in .DXF file -
350S Need to re-create file

351E Cannot find ENTITIES in .DXF file –

351S Need to re-create file

352E The .DXF file is above R12 version -
352D Current software cannot support part/ir-stock
352D .DXF file above R12 version in Nest Manager environment.
352S Save your part/ir-stock .DXF file as in R12 format.

400E Not all shapes are nested. Insufficient stock.
400E For more information, look at the summary.

500E Not Enough Memory.
500D Error due to insufficient memory to execute the AutoNEST program.
500S Remove all unnecessary memory-resident programs.

500S If in AutoCAD environment, check acad.pgp for memory reserve
500S for all the programs. If possible, increase the memory reserve
500S for the program. [For more information, please refer to AutoCAD
500S Reference Manual, Appendix B]

600E Pointer out of range
600D Software bugs.
600S Report to AutoNEST Dealer.

601E Array Out Of Range
601D Software bugs.
601S Report to AutoNEST Dealer.

602E Part expansion error -
602E Expanded part contains invalid geometry
602D The part after expansion to the specified cutting gap may
602D contain invalid geometry or the number of vertices of the

602D expanded part exceeds the limit : 350 vertices.
602S Re-create the part by reducing the number of vertices.
602S This may help to solve the problem. If not, Report it to
602S AutoNEST Dealer.

652E Nesting Error: -
652E Report to AutoNEST Dealer

8.1 *Auto*NEST System Files

In *Auto*NEST, there are three system files that affect and control the performance of NestPRO, the nesting engine and other functions. They are :

ANEST.SYS	ANEST.SYS contains all the relevant and essential variables that affect parts approximation in ***Nesting*.**
ANEST.TOL	ANEST.TOL contains the '**aperture**' value for ***SavePart / MirrorPart*** and part expansion control for cutting gap consideration and arc approximation for nesting speed and quality.
ANEST.SET	ANEST.SET contains parameters that will interface with non-AutoCAD systems, where a full ***DXF*** is required or the layer names are restricted to numeric. ANEST.SET also contains the default values for ***TaskEdit***.

The following pages provide detailed information of the above system files.

ANEST.SYS

Format for ANEST.SYS

```
#
# AutoNEST V9
# File Name = ANEST.SYS
#
@SHP_APPROX
25      # Minimum vectors
5       # Maximum No of loops
25      # Minimum concave area increment (in percentage)
8.0     # Total Area Increment (in percentage)
2       # Minimum Arc (in percentage)
0.08    # Global tolerance factor (wrt largest enclosing rectangle edge)
3.0     # Local tolerance factor (wrt neighbouring edge)

@NEST_CONTROL
3       # 0: No Nestb  1: Normal + Nestb  2: Nestb Only  3: As indicated in UI
30      # Nestb maximum group number
1       # Nestb minimum average number per group
0.1     # Nestb flexible ratio (0.0 to 0.1)
0       # 1: Nestb keep grid, 0: break grid

@REMNANT_CONTROL
1       # 0 : Fill whole stock with filler parts.
        # 1 : Fill stock with filler parts up to the basic qty edge)
0.10    # If last stock (after nest the basic qty parts) remains 10% or less,
        # fill up the rest of stock with filler parts.

@SIMPLIFY_CONTROL
200     # minimum number of vertices of polygon to do simplification in PIP
        # adjust higher will slow down nest but will get better PIP pattern
0.05    # Part simplification ratio to remove concave gaps (0.00 - 0.10)
```

@SHP_APPROX

Under this heading are the parameters that influence how a polygon profile is being approximated. Generally, the rougher the approximation, less number of vectors will be used to represent the geometry. Fewer vectors will decrease the workload of the nesting process.

The user can judiciously adjust the following parameters for maximum performance during the nesting process.

Profile approximation is therefore more effective when the original number is large. However too much approximation may also lead to profile distortion that provides inefficient nesting.

1) **Minimum Vectors** (for Polygon Approximation = 25)

It is the minimum number of vectors in one polygon profile before part approximation routine is allowed.

Generally, a polygon profile with less than 25 vectors when approximated would produce a new profile that is quite different from the original part. Therefore a limit is imposed to prevent unexpected results.

2) **Maximum No of Loops** (= 5)

The maximum number of times the subroutine processes through all the vertices of a profile. It acts as a safety counter to ensure that the subroutine will terminate properly.
However it is to be noted that complex profiles require more approximation passes. Too many passes will make the process longer, too little will not give an efficient approximation. A judicious number will be derived from the user's experience.

3) **Minimum Concave Area Increment (**in percentage = 25 **)**

This parameter has an important role in controlling the amount of "cut-through" in concave portion of the polygon profile. It is the incremental area allowed for all the "cut-through" in concave approximation.

Increase in the parameter will result in greater amount of "cut-through" during approximation.

Note that another parameter, 'Minimum Arc', does play a similar role in controlling the amount of "cut-through" as this control parameter. 'Minimum Arc' will be discussed later in the section.

4) **Total Area Increment** (in percentage = 8)

As the routine approximates a polygon profile, the net area will be expanded. A limit in area increment is therefore necessary before the new profile is grossly different from its original profile.

This value is the additional percentage in area increment that is allowed for the approximation subroutine.

The approximation will be terminated once the area increment exceeds the value of parameter or in the case when there is no more approximation possible.

Do not confuse this parameter with the ‘ Minimum Concave Area Increment’ discussed previously. The present parameter is using the total area of profile after approximation in deciding the quitting of subroutine. The previous parameter is used during the concave portion of the profile.

5) **Minimum Arc**
This parameter is not valid for current version.

6) **Global Tolerance Factor** (= 0.08)

7) **Local Tolerance Factor** (= 3.0)

@NEST_CONTROL

There are 5 parameters under @NEST_CONTROL which control the NESTB nesting engine. Each of them are explained below :-

1st Parameter :

0	Do not use the exhaustive nesting engine, NESTB
1	Use the normal nesting engine OR NESTB depending on the TASK (.job)
2	Always use the exhaustive nesting engine, NESTB.
3	As indicated in the UI. By default, option 0 is used for nesting. If the “Extended” check-box is marked, then option 1 will be employed.

2nd Parameter :

30	Increasing this number will also increase the chance of a task being submitted to the NESTB engine.

3rd Parameter :

1	Default is “1”. This is the lower limit of the average number of individual parts in a Task for NESTB.

4th Parameter :

0.1	This means that NESTB is able to extend beyond 10% from the nested pattern when considering if a part or a group of parts are suitable.

5th Parameter :

1 If there is a grid pattern consisting of identical shapes in the nesting result. NESTB engine will not break the grid, and retain its regularity in the final output.

0 If there is a grid pattern consisting of identical shapes in the nesting result. NESTB engine will ignore the regularity of the grid, and will carry out any necessary operation to make the final result tighter.

@REMNANT_CONTROL

There are 2 parameters under @REMNANT_CONTROL. Each of them are explained below :-

1st Parameter :

0 Always fill-up the whole stock with filler parts.

1 Fill stock with filler parts, only up the edge of the “Basic qty” parts.

2nd Parameter :

0.10 If last stock (after filling in the basic quantity) remains 10% or less, then fill up the rest of the stock with filler parts, otherwise do not.

@SIMPLIFY_CONTROL

There are 2 parameters under @SIMPLIFY_CONTROL. Each of them are explained below :-

1st Parameter :

200 Minimum number of vertices of polygon to do simplification in PIP, adjusting higher will slow down nesting but will get better PIP pattern.

2nd Parameter :

0.05 Part simplification ratio to remove concave gaps (0.00 to 0.10). Higher value will make nesting fast, but waste more stock material; lower value will use more nesting time, but waste lesser stock material.

ANEST.TOL

Format for ANEST.TOL

```
#
# AutoNEST V9
# Filename = anest.tol
#
# Angle tolerance = Number of vertices(minimum),angular allowance
@ANGTOL
5  2.000000
10 5.000000
20 10.00000
60 20.00000
#
# APERTURE = Size of the aperture
@APERTURE
0.10
#
# Shape Expansion = (Max) angle to trim, trim ratio
@SHP_EXPAND
90 1.0
#
# Arc APPROXIMATION ERROR TOLERANCE (>=0.001)
@ARC_APPROX_ERROR_TOll
0
0.01
```

@ANGTOL

This parameter is not valid for current version.

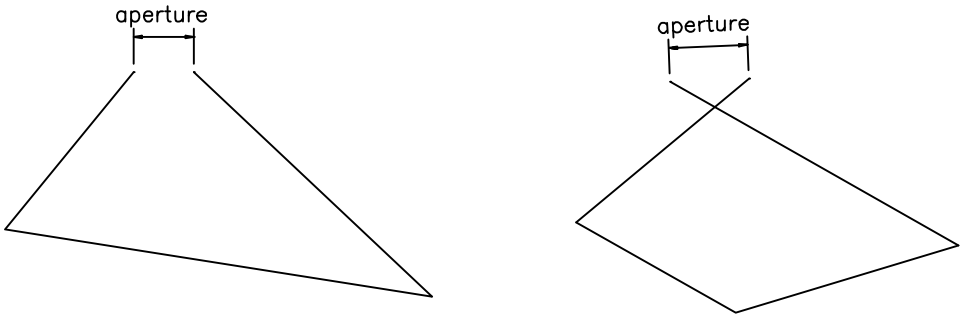
@APERTURE

Under this header, you can specify a value (floating point) for the 'Aperture' to be used in ***SavePart*** / ***MirrorPart*****.** This aperture value allows you to control the degree of accuracy when considering whether two distinct end points actually meet.

If the current units is Metric/millimeters, then the value is taken as millimeter(s). On the other hand, if the units is Imperial/inches, then the value is taken as inch(es).

'**Aperture**' is the degree of accuracy of 2 very close but distinct points to be considered as the same point. Therefore, polygons with vectors not entirely closed or overlapping will still be tolerated if the distance apart is within the default aperture.

See below :



@SHP_EXPAND

Under this header, you can specify 2 parameters to control part expansion for cutting gap consideration. These parameters correspond to the maximum angle between 2 vectors at a vertex and the trimming ratio.

Part expansion occurs at two places: during the execution of ***Nesting*** ***or*** ***BatchNesting*** and ***ExpandPart.***

After a part has been expanded, the expanded profile may consist of long narrow and pointed edges. These edges will cause obstruction during the nesting process. It is therefore advisable to trim off these pointed edges. The amount of trimming required for your application is defined here.

The first parameter indicates the range of angles to be considered for trimming. Default is 90, which means that any angle less than 90 will be trimmed. The second parameter specify the amount to be trimmed (ratio of cutting gap) at the vertices of the part/shape. Default is 1.0.

@ARC_APPROX_ERROR_TOLL

Under this header, you can specify 2 parameters to control arc or circle approximation if a part has arcs or circles as profiles.

The first parameter can be set to 1/0. 1 means this parameter is on and 0 means off. If it is off (0), the second parameter will be ignored. Otherwise the second parameter means the error tolerance when approximating arcs or circles. The smaller the value is, the less distortion the approximated profile is. For instance, if the first parameter is set to 1 and the second parameter is set to 0.01, after approximating a circle part, the new part radius will increase at most 0.01.

It’s recommended that the first parameter be set to off (0), i.e., users do not have to use this control parameter. The system will handle arc approximation automatically.

Only when you have some very big parts which are very close to the stock sizes, you may need to set this parameter on to adjust arc approximation to fit the parts. Otherwise you may not be able to nest those big parts.

ANEST.SET

This file is used for interfacing with CAD systems other than AutoCAD. It also contains the default values of ***TaskEdit***.

A sample ***.DXF*** file is required. To create ***sample.dxf*** file, open a drawing called SAMPLE in the particular CAD software used and do a "DXFOUT" equivalent command.

Format for ANEST.SET

#
 # AutoNEST V9
 # Filename = anest.set
#
 # 1. Shape dxf sample filename
 # 2. Shape dxf option (1 BLOCK/ 0 ENTITIES)
 # 3. Nested layout dxf sample filename
 # 4. Nested layout dxf option (1 BLOCK/ 0 ENTITIES)
 # 5. Insertion point 0: Shape box center; 1:Fix insertion as below; 2:Use DXF "INSBASE" value
 # 6. Insertion point x and y
 # 7. Layer option (1 to set default layer name)
 # 8. Name of default Layer
 # 9. Default Cutting Gap
 # 10. Default Edge Allowance (Left, Right, Top, Bottom)
 # 11. No of default Stocks
 # 12. Default stock specifications: Width x Length Qty Priority
#
sample
0
sample
0
1
0.00 0.00
1
1
3.00
3.00 3.00 3.00 3.00
3
1200x2400 5 1
1500x3000 10 2
1500x6000 99 3

Lines starting with # character denote 'Comments'. The **'AutoNEST V9'** must be in one of the comment lines. There is no limit to the number of comment lines.

Explanatory Notes for ANEST.SET

Line 1 and 3	These are template ***DXF*** files created by your particular CAD system. ***DXF*** support for each CAD system may differ slightly, *Auto*NEST requires these templates from sample ***DXF*** files to generate a fully compatible ***.DXF*** file. Such ***DXF*** file should be loaded with all the necessary information, e.g. linetypes, layers, etc.
Line 2	Refers to ***DXF*** format for part/shape geometry files. For BLOCK representation, the part/shapes must be inserted into the drawing as AutoCAD Blocks. ALL Blocks must be inserted in the "ANEST" layer. The part/shape name will be written into the Block section of the ***DXF*** file for that particular part/shape. For ENTITIES format, the part /shape must be drawn using "entities" (eg. LINE, ARC, CIRCLE …etc). Each file should contain 1 part /shape.
Line 4	Refers to the DXF format of the nested output. For reviewing of nested output within **Nest Manager** environment, the user can only choose either ***DXF*** or ***VEC*** File Format option in ***Sysdata***. **DXF Option in SYSDATA** For BLOCK format, *Auto*NEST will copy the part /shape block information from the dxf file of the part/shape only once and insert the part/shape name repeatedly as required into the dxf file of the nested layout. This option will produce a smaller dxf file. For ENTITIES format, *Auto*NEST will copy part/shape information from the dxf file of the part/shape and write these information into the dxf file of the nested layout repeatedly. **VEC Option in SYSDATA** For BLOCK format, *Auto*NEST will read all points from the ***VEC*** file of the part/shape and create a part/shape block in the dxf file of the nested layout. This part/shape block will be inserted repeatedly as required. For ENTITIES format, *Auto*NEST will read all points from the ***VEC*** file of the part/shape, then copy these points into the ***DXF*** file of the nested layout repeatedly when as required.

Line 1 and 3	These are template ***DXF*** files created by your particular CAD system. ***DXF*** support for each CAD system may differ slightly, *Auto*NEST requires these templates from sample ***DXF*** files to generate a fully compatible ***.DXF*** file. Such ***DXF*** file should be loaded with all the necessary information, e.g. linetypes, layers, etc. Some CAD software does not have the BLOCK section in their ***DXF*** file format, e.g. AutoSketch. In this case, the user can only choose ENTITIES option.
Line 5	Denotes to the Reference Point whereby the insertion points of the part/ shapes within the nested layout are referred to. **0** – Use the centre of the enclosing rectangle of the part. **1** – Use the insertion point as indicated in line 6. **2** – Use the INSBASE variable value from part DXF file
Line 6	Input of x and y coordinates.
Line 7	Value of '1' will enable AutoNEST to read layer name from Line 8.
Line 8	Input of layer name where nested layout is to be generated. This layer name should conform to the particular CAD system's criteria.
Lines 9 to 12	Contain the default values for ***TaskEdit***.
Line 9	Cutting Gap specification.
Line 10	Edge Allowance - Left, Right, Top and Bottom.
Line 11	Number of distinct Stocks.
Line 12	Stock Specifications for each distinct Stock - in the following format :- **WidthxLength Quantity Priority** If the Stock is “stretchable”, append the “>” character to the Length of the stock size. Example : **2000x4000>** If the Stock is non-stretchable, just give the exact dimension of the stock size. Example : **3000x6000** If there are 3 nos. of distinct Stocks specified in Line 11, subsequently Lines 12 to 14 will indicate the detailed stock specifications for each of the 3 distinct stocks.